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Record of Decision:

SUMMITVILLE MINE
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ADMINISTRATIVE RECORD

INTERIM RECORD OF DECISION

FOR

HEAP LEACH PAD

Summitville Mine Superfund Site
Summitville, Colorado

INTERIM RECORD OF DECISION
for the
HEAP LEACH PAD

Summitville Mine Superfund Site
Summitville, Colorado

DECLARATION FOR THE RECORD OF DECISION

Site Name and Location

Summitville Mine Superfund Site, Summitville, Rio Grande County, Colorado.

Statement of Basis and Purpose

This decision document presents the selected interim remedial action for reducing or eliminating acid mine drainage (AMD) and cyanide contaminated waters from the Heap Leach Pad (HLP) at the Summitville Mine Superfund Site in Rio Grande County, Colorado chosen in accordance with the requirements of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), 42 U.S.C. § 9601 et seq., as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA) and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP)(40 CFR Part 300).

This decision document explains the basis and purpose of the selected interim remedy for the HLP portion of the Summitville Minesite.

The State of Colorado Department of Public Health and Environment (CDPHE) concurs with the selected interim remedial action.

Assessment of the Site

Interim remedial actions are appropriate "to protect human health and the environment from an imminent threat in the short term, while a final remedial solution is being developed." ("Guide to Developing Superfund No Action, Interim Action and Contingency Remedy RODs," EPA. OSWER Publication 9355.3-02FS-3, April 1991). Actual or threatened releases of hazardous substances from this Site, if not addressed by implementing the interim remedial action selected in this Interim Record of Decision (IROD), may present imminent and substantial endangerment of public health, welfare, or the environment.

Description of Selected Remedy

The interim remedial action for the HLP addresses the reduction or elimination of acid mine drainage and cyanide contaminated waters from the Heap Leach Pad. The purpose of this interim remedial action is to control the transport of cyanide and toxic metals from the Heap Leach Pad (HLP) into Cropsy Creek and Wightman Fork.

This interim remedial action is anticipated to produce continued reduction of contaminated water flows to the Alamosa Watershed. The results of the interim remedial action will be routinely monitored to determine the additional actions needed at each portion of the Site to achieve the final, sitewide remediation goals.

The major components of the selected interim remedy include:

- Development and implementation of HLP solution collection system consisting of injection/extraction wells installed in the HLP;
- Pumping and treating of the contaminated leachate;
- Short term biotreatment of waters, in-situ biotreatment of ore and leachate using, cyanide-destroying bacteria;
- Grading, recontouring, capping and revegetating the HLP to reduce the volume of water to be treated;
- Installation of a lined surge pond and a bioreactor using sulfate-reducing bacteria to treat acid waters generated after the HLP is remediated; and
- Periodic monitoring of ground water for cyanide and/or metal concentrations.

This interim remedy is consistent with current or future activities to complete sitewide remediation goals.

No changes have been made to the preferred alternative originally presented in the Heap Leach Pad Proposed Plan. However, the sequence of numbering the alternatives in the IROD varies from that of the Heap Leach Pad FFS because some of the Heap Leach Pad FFS alternatives were not retained after the screening process.

Therefore, Alternatives 5-3 through 5-6 of the IROD correspond to Alternatives 5-4 through 5-7 of the Heap Leach Pad FFS, respectively.

Statutory Declarations

This interim remedial action is protective of human health and the environment, complies with Federal and State applicable or relevant and appropriate requirements (ARARs) for this interim limited-scope action, and is cost effective. Although this interim action is not intended to address fully the statutory mandate for permanence and treatment to the maximum extent practicable, this interim action does utilize treatment and thus is in furtherance of that statutory mandate. Because this action does not constitute the final remedy for the Site, the statutory preference for remedies that employ treatment that reduces toxicity, mobility, or volume as a principal element, although partially addressed in this remedy, will be addressed in the final response action. Subsequent actions are planned to fully address the threats posed by the conditions at this Site. Because this remedy will result in hazardous substances remaining on-site above health-based levels, a review will be conducted to ensure that the interim remedy continues to provide adequate protection of human health and the environment within five years after commencement of the remedial action. Because this is an interim ROD, review of this Site and of this remedy will be ongoing as the EPA continues to develop final remedial alternatives for the Site.

<IMG SRC 0895096>
William P. Yellowtail
Regional Administrator
U.S. Environmental Protection Agency, Region VIII

<IMG SRC 0895096A>
December 15, 1994

TABLE OF CONTENTS

1.0 DECISION SUMMARY 1
- 1.1 Site Name, Location, and Description 1
  - 1.1.1 Climate 1
  - 1.1.2 Topography 1
  - 1.1.3 Geology 2
  - 1.1.4 Hydrogeology 3
  - 1.1.5 Present Surrounding Land Use and Populations 4
- 1.2 Site History and Enforcement Activities 4
  - 1.2.1 Site History 4
  - 1.2.2 Enforcement Activities 6
- 1.3 Community Participation 7
- 1.4 Scope and Role of Interim Remedial Action within Site Strategy 9
  - 1.4.1 Remedial Action Objectives and Goals 15
- 1.5 Site Characteristics 16
  - 1.5.1 Nature and Extent of Contamination 16
  - 1.5.2 Contaminant Transport and Migration 24
  - 1.5.3 Heap Leach Pad 25
  - 1.5.4 ARARs 25
- 1.6 Summary of Site Risks 38
  - 1.6.1 Screening Ecological Risk Assessment 38
  - 1.6.2 Environmental Risk Assessment 40
  - 1.6.3 Human Health Risk Assessment 41
- 1.7 Description of Alternatives 42
  - 1.7.1 Alternative 5-1: No Action 42
  - 1.7.2 Alternative 5-2: Pump and Treat/Recontour & Cap 42
  - 1.7.3 Alternative 5-3: Injection-Extraction Wells/Pump & Treat/Biotreatment/ Recontour & Cap/Bioreactor 43
  - 1.7.4 Alternative 5-4: Extraction Pumps & Underdrippers/Water Rinse/Recontour & Cap 45
  - 1.7.5 Alternative 5-5: Partial HLP Removal/Injection-Extraction Wells/Water Rinse/Recontour & Cap....45
  - 1.7.6 Alternative 5-6: Pump and Treat/Total HLP Removal/Ex situ Ore Treatment/Disposal On-Site 46
- 1.8 Comparative Analysis of Alternatives 47
  - 1.8.1 Criteria 1: Overall Protection of Human Health and the Environment 48
  - 1.8.2 Criteria 2: Compliance with ARARS 48
  - 1.8.3 Criteria 3: Long-Term Effectiveness and Permanence 49
  - 1.8.4 Criteria 4: Reduction of Toxicity, Mobility or Volume 49
  - 1.8.5 Criteria 5: Short-Term Effectiveness 50
  - 1.8.6 Criteria 6: Implementability 50
  - 1.8.7 Criteria 7: Cost 50
  - 1.8.8 Criteria 8: State Acceptance 50
  - 1.8.9 Criteria 9: Community Acceptance 50
- 1.9 Selected Alternative 51
- 1.10 Statutory Determinations 52
  - 1.10.1 Protection of Human Health and the Environment 52
  - 1.10.2 Compliance with Applicable or Relevant and Appropriate Requirements 52
  - 1.10.3 Cost Effectiveness 53
  - 1.10.4 Utilization of Permanent Solutions and Alternative Treatment Technologies to Maximum Extent Practicable and Preference for Treatment as a Principal Element 53

2.0 RESPONSIVENESS SUMMARY 54
2.1 Responsiveness Summary Overview 54
2.2 Summary and Response to Heap Leach Pad Specific Comments 54
2.3 Summary and Response to General Comments 64
2.4 Summary and Response to ARARs Comments 79
2.5 Summary and Response to Reynolds and Chandler Adit Questions 84

3.0 REFERENCES 92

LIST OF TABLES

Table 1 - Copper Content - Site Contaminated Water
Table 2 - Cyanide Content - Site Contaminated Water
Table 3a - Site Surface Water and Treatment Plant Flow Rates
Table 3b - Site Surface Water and Treatment Plant Water Volume
Table 4- Containment Content During High and Low Flow Periods
Table 5 - Copper Concentration at W.F. 5.5
Table 6 - Total Cyanide Concentration at W.F. 5.5
Table 7 - ARARs
Table 8 - Numeric Surface Water Quality Goals and ARARs
Table 9 - Heap Leach Pad Remedial Alternatives
Table 10 - Comparative Analysis of Alternatives

LIST OF FIGURES

Figure 1 - Area Map
Figure 2 - Mine Site Footprint
Figure 3 - Geology - Cropsy Valley Section
Figure 4 - Contaminated Surface Water Streams
Figure 5 - Alamosa River Stream Segment Classifications

1.0 DECISION SUMMARY

1.1 Site Name, Location, and Description

The Summitville Mine Superfund Site is located about 25 miles south of Del Norte, Colorado, in Rio Grande County. (Figure 1). It is located within the San Juan Mountain Range of the Rocky Mountains, approximately two miles east of the Continental Divide, at an average altitude of 11,500 feet. The mine is positioned on the northeastern flank of South Mountain. The disturbed area at the Site covers approximately 550 acres (Figure 2). On the north, the Site is bounded by the deserted town of Summitville, and by Wightman Fork Creek. It is bounded by Cropsy Creek to the east and the peak of South Mountain to the southwest. The Site is located in the Rio Grande Drainage Basin near the headwaters of the Alamosa River. Two tributaries drain the Site - Wightman Fork Creek and Cropsy Creek. The confluence of Cropsy Creek and Wightman Fork is located on the northeastern perimeter downstream of the Site. Wightman Fork Creek drains into the Alamosa River approximately 4.5 miles below the Cropsy Creek confluence.

1.1.1 Climate

The Site climate is characterized by long cold winters and short cool summers. Winter snowfall is heavy and thunderstorms are common in the summer. Temperatures range from a high of 70°F and a low of 17°F in the summer to a high of 40°F and a low of -25°F in the winter. The Site receives an average of 55 inches of precipitation annually, mostly in the form of snowfall with annual evaporation at approximately 24 inches.

There is a relatively snow-free period of 5-6 months from May through October. This period is regarded as the "construction season." Site access and operations during the rest of the year requires a significant amount of snow removal. Continued water treatment and flow, or meticulous winterization, is required to prevent water from freezing in the pipes.

1.1.2 Topography

Approximately 550 acres of the Site is comprised of heavily altered terrain due to mining operations. The Site's pre-1870 topography consisted of upland surfaces, wetlands, and South Mountain peak. The predominant Site ground cover was alpine tundra at the higher elevations with coniferous forest and subalpine meadow in the lower elevations. The mountains surrounding the Site, including Cropsy Mountain to the south, are between 12,300 feet and 12,700 feet in elevation.

The Wightman Fork drainage covers approximately 3.0 square miles upstream from the Wightman Fork diversion. The catchment elevations range from 11,225 feet to 12,754 feet. The Cropsy Creek drainage area entails 0.85 square miles on the northeast slopes of the Cropsy Mountain and the southern slopes of South Mountain. Elevations within this drainage range from 12,578 feet down to 11,200 feet at the Cropsy Creek confluence with Wightman Fork. Wightman Fork drains into the Alamosa River approximately 4.5 miles from the Cropsy Creek confluence.

Disruption of the topography began on a limited scale in 1870, with placer gold mining in stream-formed alluvial deposits. This placer mining was followed by open cut mining on gold-bearing quartz veins. Underground mining followed. As mining production depths increased, several processing mills were constructed to handle the increased capacity and produce a concentrate suitable for transit. This initial mining phase lasted through 1890 and additional underground mining from 1925 to 1940 resulted in surface deposition of waste rock near the adit entrances. Additionally, piles of mill tailings were placed downgradient from the stamp mills and the 1934 flotation-cyanidation mill.

Further surface disruption of the topography resulted from work in the late 1960's when Wightman Fork was diverted north to allow construction of a tailings pond. With this new impoundment, mill tailings were put on the Beaver Mud Dump (BMD) down to the Summitville Dam Impoundment (SDI) (previously referred to as the Cleveland Cliffs Tailings Pond).

The most dramatic surface alterations started in 1984 with the construction of the mine pits and dumps, formed as a result of Summitville Consolidated Mining Company, Inc.'s (SCMCI's) open pit heap leach gold mine. The main topographical feature is the highwall of South Mountain. This highwall is fractured and has a one to one (horizontal to vertical) slope.

1.1.3 Geology

Summitville is located near the margin of the Platoro-Summitville caldera complex. Rocks in the mine area consist of South Mountain Quartz Latite Porphyry. The porphyry is underlain by the Summitville Andesite. The contact between the latite and andesite is intrusive, faulted in some areas and is nearly vertical. On the north side, the contact is fault-bounded by the Missionary Fault. South Mountain is bounded on the southwest by a large northwest-southeast trending regional fault called the South Mountain Fault. The South Mountain Quartz Latite Porphyry is bounded to the west, on both sides of the South Mountain Fault, by slightly older Park Creek Rhyodacite. It is overlain at higher elevations by erosional remnants of slightly younger Cropsy Mountain Rhyolite.

South Mountain volcanic dome emplacement, alteration, and mineralization occurred in rapid sequence approximately 22.5 million years ago. Magmatic, surfate-laden water expulsed from the quartz latite magmas was hot and highly acidic ($pH \leq 2$, temperature of 250°C), and caused extensive alteration to the quartz latite. Alteration occurs in four sequential zones: the massive vuggy silica zone, the quartz-alunite zone, the quartz-kaolinite zone, and the clay alteration zone. The massive vuggy silica zone is often a highly porous zone in which all major elements but silica and iron were leached by acidic solutions and replaced in places by excess silica. This zone occurs in irregular pipes and lenticular pods, and generally shows greater vertical than lateral continuity. The next outwardly occurring zone is the quartz-alunite zone, in which feldspars of the quartz latite porphryry were replaced by alunite. This zone grades outward to a thin quartz-kaolinite zone, which is not always present, and then into an illite-montmorillonite-chlorite zone in which feldspar and biotite grains were replaced by illite and quartz, with lesser kaolinite and montmorillonite. The quartz-alunite and clay alteration zones are the most volumetrically significant. Fine-grained pyrite is disseminated through the groundmass in all zones.

Summitville mineralization is an example of epithermal Au-Ag-Cu mineralization associated with advanced argillic alteration. Mixed magmatic and surface water (derived from snowmelt and rainfall), less acidic and more reducing than the magmatic water that produced the alteration zones, deposited metals and metallic sulfides at shallow (<1 kin) depths. Mineralization is associated mostly with the porous vuggy silica zone, and occurs as covellite + luzonite + native gold changing with depth to covellite + tennanite. Gold also occurs in a near-surface barite + goethite + jarosite assemblage that crosscuts the vuggy silica zone.

Post-volcanic geologic processes have been largely erosional. The two major streams that drain the Site, Cropsy Creek and Wightman Fork, tend to follow the quartz latite/andesite contact Numerous springs and seeps occur at this junction between the fractured quartz latite porphyry aquifer and the underlying dense andesite aquitard.

Site cover material consists of topsoil, silt, clays, and gravel. The topsoil is described as grey/brown/orange, non-plastic with a trace of roots and sand. Clays are of low to medium plasticity with some gravel.

1.1.4 Hydrogeology

Ground water at the Site is present as a series of intermittent, shallow, perched aquifers. Shallow ground water occurs in surficial deposits consisting of colluvium, "slope wash" alluvium and/or glacial ground moraine and weathered parts of the Summitville Andesite. These shallow systems eventually discharge to surface water. The upper perched aquifer system also contributes to the ground water recharge of the fractured bedrock system. Numerous springs and seeps cover the entire Minesite, the greatest number at the locus of the distal edge of the dome. Most of the springs and seeps flow in direct response to precipitation, with high and low flows corresponding to high and low flow of the surface water system in the area.

A natural surface water drainage system exists along the southern portion of the Summitville Site. The surface water drainage system includes Cropsy Creek and Wightman Fork. Extensive re-working of both drainage systems has been conducted.

1.1.5 Present Surrounding Land Use and Populations

The Site is surrounded by National Forest Service land (Rio Grande National Forest). The multiple-use designation of this land gives it a high level of desirability for snow mobiling, cross country skiing, hiking, camping, horseback riding and picnicking. Additionally, logging activity is on-going adjacent to Park Creek Road and other roads adjacent to the Site. During the summer months, domestic cattle and sheep graze in the surrounding area and during the winter months, the surrounding area is heavily used for hunting.

The distance to the nearest off-site building is 2.1 miles to the east. The water from the Site flows past the town of Jasper into Terrace Reservoir, both of which are recreational areas. Private residences and a Phillips University Camp use water from wells adjacent to the Alamosa River. Below the Terrace Reservoir, the river flows past the town of Capulin which contains two municipal wells and many domestic wells. Throughout this drainage area, homes, farmsteads and ranches depend upon alluvial wells or river water for potable or agricultural water production. However, recent EPA analysis indicates that the Site has not impacted alluvial drinking water supply wells. Additionally, water from the Alamosa River is used within the Monte Vista Wildlife Refuge and in the La Jara Creek system through the Empire Canal.

1.2 Site History and Enforcement Activities

1.2.1 Site History

Placer gold was discovered in Wightman Gulch in the summer of 1870. The lode deposit was found near the headwater in 1873 and by 1875, open cut workings had been established. The ore consisted of native gold in vein quartz, reportedly associated with limonite and other ion oxides, which comprised the surficial, oxidized zone of the deposit. Because this zone reportedly extended to 450 feet below the surface, adits and shafts had to be driven into the veins. There was only minor production in the mine area from 1890 to 1925.

In 1897, the Reynolds Adit was driven into the Tewksbury vein, located below the central portion of the contemporary Summitville pit. The Adit was completed in 1906. Reports of acidic water exiting the adit soon followed.

A significant gold find occurred in 1926 when high grade ore was struck. From 1926 to 1931, 864 tons of ore were extracted. The Reynolds Adit was rehabilitated to provide haulage and development access. Plans were made to connect the Reynolds to the Iowa Adit, 540 vertical feet above the Reynolds. This connection was completed in 1938. Iowa ores were then dropped down to the Reynolds level for haulage. The Reynolds and the Iowa Adits also provided drainage for the main workings.

A 100 ton-per-day flotation/cyanidation mill and gold retort was installed in 1934. Records indicate that dewatering filitrate from the flotation circuit was discharged directly into Wightman Fork throughout the mid-1930's.

In 1941, three tunnels were in operation: the Iowa, Narrow Gauge, and Reynolds. During World War II, the government mandated the termination of mining of non-essential minerals to focus on essential minerals needed for the war effort. Gold production ceased.

From 1943 to 1945, a high grade copper vein found in the Narrow Gauge and Reynolds was developed. By 1944, only the Narrow Gauge Tunnel was operating. In I947, the Reynolds was again rehabilitated. Approximately 4,000 feet of rail needed replacement due to deterioration from acidic water. By 1949, the water flow discharge from the Reynolds ranged from 100-200 gallons per minute (gpm).

From 1950 to 1984, the minesite was the target of several exploration and underground rehabilitation programs. Production of copper, gold, and silver was sporadic. An extensive drilling program was conducted in the late 1970's and early 1980's to delineate a potentially minable gold deposit.

The underground and surface operations during the original discovery of gold to the early 1980's resulted in surface deposition of waste rock near adit entrances and deposition of mill tailings downgradient of the original mill, close to the south bank of the original Wightman Fork Creel An attempt to process ore to extract copper content in the late 1960's and early 1970's resulted in a diversion of Wightman Fork from its original route to further north of the existing tailings, construction of the SDI (1669) and deposition of mill tailings east of existing tailings piles.

During recent operations (1984-1991), Summitville Consolidated Mining Company Incorporated (SCMCI), a wholly-owned subsidiary of Galactic Resources, Inc., developed the remaining mineral reserves as a large tonnage open pit heap leach gold mine. Gold containing ore (9.7 million tons) was mined, crushed and heaped onto a cornered clay-and-synthetic-lined pad. A solution coning 0.1-0.5% sodium cyanide was applied to crushed ore on the Heap Leach Pad (HLP) and was allowed to percolate through the ore to leach out gold. The solution was then pumped from the ore and gold was removed from the leachate with activated carbon. The leaching solution was rejuvenated by restoring the target cyanide level and recycled through the heap. Gold was stripped from the carbon, precipitated from the stripping solution, smelted to make dore metal, and sold.

The Summitville HLP is a "valley fill" design. This design differs from more widely employed designs in that it is more of a lined depression, or rock filled pond, than a lined leaching "pad". Utilization of a valley fill design usually results from topographic limitations that make construction of a free draining pad difficult. The process solution was pumped directly from the HLP to the gold recovery plant. The more common leach pad design enables water percolated through ore to constantly drain to a "pregnant solution pond" outside of the HLP, rather than being held in the same containment area as the crushed ore. The design of the HLP as a continuous water containment structure prevents the natural drainage of water from the cyanide bearing pad and complicates the closure of the ore pile. The HLP containment feature was constructed in a portion of the valley occupied by Cropsy Creek. Cropsy Creek was moved to allow construction of the HLP. After diversion of Cropsy Creek, a portion of the valley was enclosed by dikes. The area between the dikes was contoured and lined and became the HLP.

Open pit mining operations conducted by SCMCI did not expose standing ground water in the mine pit. Infiltration of surface water (derived from snowmelt and rainfall) through the pit may have resulted in elevated dissolved metal concentration in the water drag from the Reynolds Adit. This trend is observed when compared to the available pre-open pit drainage data.

During the SCMCI operation, topsoil was stripped and placed into stockpiles. Other overburden and waste material was used for road and dike construction, placed into the Cropsy Waste Pile (CWP), placed in the North Pit Waste Dump, and placed over the historic mill tailings to form the Beaver Mud Dump. Difficulties in processing some of the ore resulted in formation of the Clay Ore Stockpile, near the present solution pumphouse location, and an in-pit stockpile. Figure 2 illustrates these areas.

The last ore tonnage was placed on the HLP in October 1991. Addition of sodium cyanide to the ore continued until March 1992. After mining operations were concluded, SCMCI proceeded toward Site cleanup and closure by converting the gold recovery plant to a cyanide destruction facility for HLP detoxification, converting the existing alkaline chlorination water treatment plant to a sulfide precipitation process, and installing a treatment plant to process Reynolds Adit drainage.

1.2.2 Enforcement Activities

In February 1991, after tracking rising concentrations of Cadmium, copper, zinc and cyanide in Wightman Fork, the State of Colorado cited SCMCI for violations of water quality legislation and issued a Cease and Desist Order.

On December 3, 1992, SCMCI declared bankruptcy and announced that financial support of Site operations would not continue beyond December 15, 1992. On December 16, 1992 the EPA Region VIII Emergency Response Branch, as a part of an Emergency Response Removal Action (ERRA), began treating cyanide-contaminated leachate from the HLP and acid mine drainage (AMD) from three significant sources, the French Drain Sump, the Cropsy Waste Pile, and the Reynolds Adit.

Site operation oversight was undertaken by the United States Bureau of Reclamation (USBR) under an inter-agency agreement with the EPA. In December 1992, Environmental Chemical Corporation (ECC), under the direction of the USBR, began conducting engineering evaluations of the water treatment processes and subsequently began improvements to water treatment processes and facilities.

The Site was added to the Superfund National Priorities List (NPL) on May 31, 1994. The HLP Focused Feasibility Study (FFS) was completed in August 1994. The EPA Region VIII is currently conducting a Potentially Responsible Party (PRP) search.

1.3 Community Participation

The Proposed Plans for the Summitville Minesite were released to the public in August 1994. The Proposed Plans, the FFSs, and other documents in the Administrative Record are available at information repositories at the following locations: Del Norte Public Library located in Del Norte, Colorado; the Conejos County Agricultural and Soil Conservation Service located in La Jara, Colorado; and the EPA Superfund Records Center located in Denver, Colorado.

Public meetings were held in Alamosa, Colorado to present the Proposed Plans and to take public comments. The comment period was extended 30 days to October 23, 1994.

Highlights of community participation are summarized as follows:

- When EPA took over the Site in December 1992, there was a great deal of public interest, mostly from farmers downstream of the Site who were concerned that their irrigation water would be contaminated. As EPA worked to reduce the chance of a catastrophic discharge of hazardous substances and began more water treatment at the Site, the farming community became satisfied that there was no imminent danger of contaminating their water supply. Since that time, there has been less local public interest about the Site. The interest in the Site nationally has been very high due to the media using Summitville as a "red flag" for the need for mining reform.

- In June 1993, a Superfund informational workshop was provided to the public in La Jara, Colorado.

- On August 2, 1993, a public meeting was held in Alamosa, Colorado describing alternatives for reducing acid mine drainage from the Cropsy Waste Pile, the Beaver Mud Dump, Summitville Dam Impoundment and the Mine Pits. An Engineering Evaluation/Cost Assessment (EE/CA) fact sheet was published. Public comment was taken until September 3, 1993.

- The Community Relations Plan for Summitville was written and distributed in September 1993. The Community Relations Plan provides a guide for EPA's community involvement program based on interviews with local citizens.

- A Technical Assistance Grant (TAG) was awarded for the Site in February 1994. This group is now well organized and has hired several consultants. The TAG Group has been active in the area in an attempt to generate interest in the Site. They have published regular Summitville columns in the Valley Courier newspaper and have held informational meetings.

- EPA held a briefing for Congressional Aides in May 1994.

- Press releases have been written for the following:
  - Proposal to place the Site on the National Priorities List (NPL)
  - Listing on the NPL
  - Announcing meetings
  - Availability of materials
  - Comment periods
  - Availability of work through bid process
  - Bid awards
  - Status of work at the Site.

- Five Site Status Updates have been written and distributed to over 200 interested parties as well as a year end report for 1993.

- Articles about the mine were written by local newspaper writers and appeared at least weekly for the past year. Files of these newspaper articles are available in the Community Relations office and will be placed in the information repositories.

- In December 1993, the EPA produced and distributed copies of videos of the Summitville Minesite. One hundred fifty copies have been circulated to schools and officials. The video gives an overview of the contamination at the Site, a brief history of the Site, and a "video tour".

1.4 Scope and Role of Interim Remedial Action within Site Strategy

The original mine permitted area includes 1,231 acres; the area referred to as the Site is comprised of approximately 550 acres of land disturbed by historic as well as recent mining activities. The most common type of contamination associated with production of a metal mine such as Summitville is the formation and discharge of large volumes of acidic water. The acid generation can occur either chemically or biologically; as part of the living processes of certain microorganisms. The acid is formed chemically when water, such as rainfall or snowmelt, and air come into contact with metallic sulfide ores. The sulfide (S2) then reacts to form sulfuric acid and sulfates. The sulfuric acid and sulfates react with the surrounding rock or soils to generate the metal concentrations within the acidic water and is then known as Acid Mine Drainage (AMD). This process continues as long as there is sulfide or sulfates, water, and air.

The primary metallic sulfides and secondary sulfates found at the Summitville Minesite are pyrite (iron sulfide), alunite (potassium aluminum sulfate), and jarosite (potassium iron sulfate). There are fourteen areas of concern at the Summitville Minesite including twelve which either generate or may potentially generate AMD. The fourteen areas are briefly described below in their general order of priority:

1. HEAP LEACH PAD (HLP): The HLP is approximately 55 acres in size and 127 feet deep at its lowest point. The Cropsy Creek was diverted around the HLP area and the HLP was then constructed in the former Cropsy Creek drainage bed. The HLP is underlain by a French Drain system and extends onto the toe of the CWP which is located upgradient within the Cropsy Creek drainage bed. The leach pad liner is leaking, causing the water within the French Drain to become contaminated with cyanide. The HLP consists of ore containing high levels of metallic sulfides sitting in a vat of cyanide and heavy metals contaminated water. In December of 1992, the EPA took over operations of the Site water treatment plant to prevent overflow of the contaminated water to the Wightman Fork and, ultimately, the Alamosa River during spring runoff. Currently the HLP is maintained at a pH of 9 to prevent the evolution of hydrogen cyanide gas. It is currently proposed that the Heap be detoxified as one of four interim actions. This action will also address the potential acidification of the heap once the cyanide is removed and a high pH is no longer maintained. The former continuous overflow of AMD to the HLP from the adjacent CWP is currently being addressed as discussed in 3 below.

2. REYNOLDS ADIT SYSTEM: The Reynolds System is composed of the underground workings which still exist under the large open Mine Pit excavated by SCMCI, and the remaining adits which access those workings. The Adits include the Reynolds, the Dexter Crosscut, the Chandler, and the Iowa. The Reynolds Adit is the main adit which was driven to drain the workings and provide an access and haulage route. The Dexter Crosscut, a drift branching westward from approximately 100 feet into the Reynolds Adit, also provided drainage, access, and haulage. The Chandler Adit accesses the upper areas of the underground workings at a higher elevation than the Reynolds Adit. The Iowa Adit accesses even higher levels of the workings and areas near the rim of the Mine Pit. The Mine Pit was hydraulically connected to the Reynolds System and contributed much of the AMD observed at the Reynolds Adit. The EPA operated an interim treatment plant to treat the average 120 gallons per minute (gpm) of AMD which exited the Reynolds Adit.

Based upon the estimated release of 44.5 percent of total copper loadings directly from the Reynolds Adit, it was determined that plugging of this system be conducted as a time-critical Removal action. A contract to plug the Reynolds Adit System was awarded on October 4, 1993 and work began on November 22, 1993. After extensive technical considerations, only the Reynolds and Chandler Adits were ultimately plugged. The Dexter Adit was found to terminate approximately 450 feet from its intersection with the Reynolds so no plug was needed. Upon completion of the Reynolds plug, there was an immediate decrease in flow and a 65 percent reduction in copper concentrations from the Site overall. Copper loadings directly attributed to the Reynolds Adit were decreased by 97 percent.

On May 25, 1994, the Chandler Adit was discovered to be discharging high volumes of water from porous/fractured rock surrounding the plug. The leak was initially estimated at 340 gallons per minute (gpm) and peaked at 725 gpm in June 1994 with high concentrations of metals and low pH. However, this new contaminant source produced less flow and less copper concentrations than experienced from the Reynolds Adit system during the previous year. Work to fortify the Chandler plug was initiated in November 1994 and plug performance will be closely monitored through the 1995 spring runoff season Since November 20, 1994, AMD exiting the Chandler has been treated through the PITS Water Treatment Plant and no longer discharges directly to Wightman Fork.

3. CROPSY WASTE PILE (CWP): The CWP was composed of approximately 6.5 million tons of low grade ore, overburden and waste rock excavated from the main Mine Pit during SCMCI's mining operations. The CWP covered approximately 35 acres and was piled as high as 120 feet from the bottom of the old Cropsy Creek drainage bed in which it was placed. Although the CWP had been capped to prevent percolation of snowmelt and rainfall, upward infiltration of ground water has begun the process of acidifying the CWP and AMD discharges are occurring from the CWP. When the HLP was extended onto the toe of the CWP, the French Drain system beneath the CWP was severed from the system below the HLP. As a result, water backed up behind the liner of the HLP into the CWP - saturating that part of the CWP and creating a 5 million gallon reservoir of highly contaminated water within the bottom of the CWP.

To prevent the overflow of AMD into the HLP, it was determined that the CWP would be addressed as a non-time-critical Removal action. During development of the Engineering Evaluation/Cost Analysis report, it became apparent that the same response action would also apply to the Summitville Dam Impoundment and Beaver Mud Dump, and that concurrent implementation would be cost effective. The response action selected in the Action Memorandum #4 issued by EPA on September 24, 1993 required consolidation of the various waste piles within the Mine Pits. Because this work would require more than one construction season to complete, the design and actual construction were phased. Phase I work was initiated on October 1, 1993 and concluded in February 1994. During this time, approximately 927,000 cubic yards of the Cropsy Waste Pile was placed in the Mine Pits. The waste materials were isolated from ground water by lining the surface of the Mine Pits with impermeable material identified on-site. A protective layer of lime kiln dust was placed on the liner prior to placement of the waste materials to neutralize any AMD generated during this work.

Phase II work was initiated in August 1994. The Cropsy Waste Pile was completed in November 1994 and the SDI/BMD are expected to be completed in December 1994. Phase II will have moved an additional 3.5 million cubic yards of waste material to the Mine Pits.

Since Phase III removal action work had not begun, EPA evaluated the removal action alternative selected in the Action Memo as one of its remedial alternatives for the CWP, SDI, BMD and Mine pits. This alternative was ultimately selected as the interim response action for those areas of the Site. This work will include construction of a final, impermeable cap and vegetation of the "footprint" areas below the CWP, SDI, and BMD.

4. WIGHTMAN FORK, ALAMOSA RIVER, TERRACE RESERVOIR (OFF-SITE): The release of large quantities of AMD from the Site have occurred since the 1870's when mining first began, though the concentrations have significantly increased since the beginning of mining activities by SCMCI. Much of the AMD generated at the Site finds its way into the Cropsy Creek or Wightman Fork creek, unless it is diverted for

treatment. The Cropsy Creek flows into the Wightman Fork at the southeastern corner of the Site. The Wightman Fork, located on the northern boundary of the Site, empties into the Alamosa River approximately 4.5 miles from the Site. The Alamosa, in turn, flows into the Terrace Reservoir about 18 miles from the Site. There are three small wetland habitats along the Alamosa where several endangered species, including the bald eagle, whooping crane, and peregrine falcon have been identified. The closest wetland is 1.8 miles form the Wightman Fork confluence. The other wetland areas are 4.2 and nine miles downstream form the confluence. These wetlands are all upstream of the Terrace Reservoir. Concerns regarding other water usage requirements, including drinking water and farm irrigation needs, are being investigated.

5. BEAVER MUD DUMP (BMD): The BMD encompasses 15 acres and consists of approximately 900,000 cubic yards of historic metallic sulfide tailings as well as overburden from SCMCI's operations. It is located immediately adjacent to and south of the Wightman Fork Creek and is a significant source of AMD. The BMD is also infiltrated by ground water and discharges AMD to the Summitville Dam Impoundment, This area is being addressed as part of the CWP Removal action and interim action.

6. SUMMITVILLE DAM IMPOUNDMENT (SDI): Formerly referred to as the Cleveland Tailings pond, the SDI is a historic sulfide rich tailings pond located within the former Wightman Fork drainage bed. The Wightman Fork was routed around the impoundment. While the Impoundment only contains about 133,000 cubic yards of material, it is thought to be hydraulically connected to the Wightman Fork and, therefore, providing AMD directly into the creek. This area is being addressed as part of the CWP Removal action and interim remedial action.

7. FRENCH DRAIN SUMP: The French Drain is a collection system which was constructed underneath the CWP and HLP to intercept and route ground water flowing from seeps below these units (CWP and HLP) back into the diverted Cropsy Creek. Because much of this ground water flows through the CWP or becomes contaminated with cyanide when passing below the HLP, it is currently routed to the water treatment systems or pumped directly into the HLP. While the French Drain is not itself a source generating contaminants, it serves as a point source discharge for contaminated water in a fashion similar to that of the Reynolds Adit system.

8. CLAY ORE STOCKPILE (Stockpile): The Stockpile is located just north of the CWP and HLP border and was originally meant to be ore for placement on the HLP. Because of its high clay content, SCMCI was unable to provide the special handling needed before the ore could be leached. The one million ton Stockpile was purposely created because of its high content of metallic sulfides and is considered to be a source of AMD.

9. MINE PITS: This is the location of the former orebody mined by SCMCI and the location of the veins that were historically mined within the Summitville mining district. The 100-acre Mine Pit has consumed most of the underground mine workings with the exception of the Reynolds Adit System described above. This area was and is highly mineralized and contains high concentrations of metallic sulfides. Approximately 70 million gallons of water (snow or rain) per year entered the Pit, passed through the remaining underground workings, and exited as AMD from the Reynolds Adit, prior to plugging. The Pit is the origin of the rock in each of the tailings areas on-site and the ore in the HLP. This area is being addressed as part of the CWP Removal Action and interim action. At this time, the Pit has been filled by the waste material and is free draining of surface water.

10. THE NORTH WASTE DUMP (DUMP): This refers to a large area located north of the Pit composed of waste rock and overburden from the Mine Pit. It contains relatively moderate mounts of metallic sulfides and is a potential source of AMD. The northern portion of the dump, primarily the slope below the 11,580 bench, was reclaimed and upper portions of the dump were regraded with some subsoil and topsoil placement during the 1991 operational season. Vegetation success has been limited due to high wind exposure.

11. GOMPERTS PONDS: These are a series of small ponds, located approximately 400 feet north of the HLP, that contained severely acidic and toxic metals contaminated water and sludges. The ponds were excavated and then covered with soils. It is unknown if any sludges or contaminated soils remain where the ponds were. If so, this area is another source of AMD.

12. ACID ROCK DRAINAGE SEEPS: There are over 48 potential acid rock drainage seeps identified on the Site. These are areas where ground water naturally comes to the surface though some may be a result of construction activities at the Site. The seeps have not yet been evaluated to determine if they are an AMD source.

13. MINE SITE ROADS: Many of the roads at the Site were constructed with waste rock from the Mine Pit. The material in these roads has not yet been evaluated to determine if they are an AMD source.

14. LAND APPLICATION AREAS: There are areas where cyanide contaminated AMD was sprayed onto the soils as a treatment method. Aeration, as a result of spraying, was meant to eliminate the cyanide contamination while the soils were supposed to attenuate the metals. These areas have not yet been evaluated to determine if they are a current AMD source.

Once these areas had been identified, the EPA was able to establish Remedial Action Objectives (RAOs) for the overall Site. Pursuant to 40 CFR section 300.43 (e)(2)(i), the RAOs were established to provide remedial goals for the Site and were developed in consideration of current regulatory guidelines, compliance with ARARs, and other identified limiting factors. The Sitewide RAOs for the Summitville Minesite are:

1. Reduce or eliminate deleterious quality water flow from the Summitville Minesite into the Wightman Fork.

2. Reduce or eliminate the need for continued expenditures in water treatment for the Summitville Minesite.

3. Reduce or eliminate the acid mine/rock drainage from the manmade sources on the Summitville Minesite.

4. Reduce or eliminate any human health or adverse environmental effects from mining operations downstream from the Site, to include the Alamosa River. Encourage early action and acceleration of the Superfund process for the Summitville Site.

An analysis of metal loadings attributable to each of the AMD source areas resulted in the development of five primary areas of focus. Many of these source areas are in drainages or are located where large amounts of surface or ground water are available for continued generation of AMD. The Cropsy-Wightman stream drainage system for the Site also serves as a way to transport the generated AMD contaminants off-site. The table below illustrates the copper loadings and flows from the drainage points as measured by SCMCI in July 1991. This approach is also based on the water quality data regarding copper loading into Wightman Fork. The table lists the contaminant sources, the yearly copper contribution to the creek from each source, and the relative percentage loading of each source:

CONTAMINANT SOURCES

SOURCE	POUNDS OF COPPER PER YEAR	RELATIVE PERCENT
Reynolds Adit	143,000	44.5
Cropsy Waste Pile	33,400	10.4
Heap Leach Pad		
overflow potential	84,000	26.2
French Drain	14,600	4.5
Summitville Dam Impoundment/ Beaver Mud Dump	17,000	5.3
Other	29,000	9.0
TOTAL	321,000	100.0

Due to the size of the Site and extent of the contamination, the Sitewide interim remediation activities are being addressed in five separate, though related actions. These five actions are:

- Plugging the Reynolds and Chandler Adits
- Movement of the Cropsy (CWP), Summitville Dam Impoundment (SDI), and Beaver Mud Dump (BMD)
- Heap Leach Pad (HLP) Detoxification/Closure
- Sitewide Reclamation
- Interim Water Treatment

The first action of the containment/isolation and stabilization project was the plugging of the Reynolds and Chandler Adits. The second action is excavation of the CWP, Tailings Pond, and BMD, with subsequent placement of this material into the Mine Pits. Both of these removal actions are in progress under Emergency Response authority as discussed above.

The Phase III work for CWP, SDI, and BMD, as well as the remaining three actions will be conducted as interim remedial actions. The CWP, HLP, and Reclamation work are expected to begin work during the 1995 construction season. The Water Treatment action will continue without interruption though modifications in actual treatment processes may be implemented during 1995.

The HLP interim remedy, developed under the EPA's FFS Analysis of Alternatives, addresses:

- Cropsy Waste Pile, Beaver Mud Dump, Summitville Dam Impoundment, Mine Pits
- Heap Leach Pad
- Interim Water Treatment
- Sitewide Reclamation

This IROD addresses the reduction or elimination of dissolved metal contaminants, the transportation of metal contaminants, and metal/cyanide complexes in surface water at the Site. This interim remedial action is targeted to mitigate point sources as they materialize. The remediation measures described in this IROD are additions and modifications to the substantial cleanup measures undertaken by EPA using Emergency Response Authorities.

1.4.1 Remedial Action Objectives and Goals

Specific HLP remedial objectives are confined to removal, containment or treatment of contaminated materials and drainage from HLP including the remnant CWP. Remedial actions will be implemented in order to eliminate or minimize metal and cyanide transport to the Wightman Fork and the Alamosa River. The impacts of transport will be monitored in the Alamosa River below the confluence with Wightman Fork.

The interim remedial action objectives and goals for HLP are as follows:

1) To eliminate or minimize HLP impacts to aquatic receptors in Wightman Fork, the Alamosa River and Terrace Reservoir.
2) To eliminate or minimize the need for continued water treatment at the HLP.
3) To reduce or control HLP drainage so that the Alamosa River will continue to be usable for agriculture in the San Luis Valley.
4) To reduce or control HLP drainage so that human health will continue to be protected from releases from HLP.
5) To implement interim remedial action at HLP in an accelerated manner, preferably within two years of signing the IROD.

The remedial action objectives and goals given above are listed in the order of immediate need. This priority is based on the current conditions at the Site. The Emergency Response Actions at the Site have reduced the imminent threat of excess cyanide release and catastrophic failure of the HLP as long as control measures remain in place, primarily water treatment. Pilot studies using fresh rinse water indicate that continued recirculation of clean water through the HLP is capable of reducing the cyanide levels to the point where it is no longer a threat.

1.5 Site Characteristics

1.5.1 Nature and Extent of Contamination

The EPA (1992) identified the Contaminants of Potential Concern (COPC) based on elevated concentration and potential toxicity of mobilized chemicals. The COPC will be finalize upon completion of the Baseline Risk Assessment. These concentrations were compared to Site-specific background levels, which were determined by standard statistical analysis (Morrison Knudsen Corp., 1994). Potential adverse effects on human health and the welfare of wildlife were preliminarily assessed (EPA, 1992). The COPC identified for the Site are copper, cadmium, chromium VI, lead, silver, zinc, arsenic, aluminum, iron, mercury, manganese, and cyanide.

All of these contaminants, except cyanide, are found at the Site in naturally occurring minerals and compounds. They are made soluble during the AMD-generating chemical process. The AMD process is accelerated by the mining activities which took place at the Site.

1.5.1.1 Acid Mine Drainage

At Summitville, mining activities resulted in additional sulfidic material surface area available for contact with oxygen and water. Air and water contact with the additional surface area provided by broken rock accelerates oxidation of minerals and creation of low pH drainage. This drainage water is high in acidity, sulfate (SO4) ions, and dissolved metals.

AMD water contributes metal loads to Wightman Fork and the Alamosa River. This creates adverse conditions preventing the growth and maintenance of a healthy aquatic ecosystem. These adverse effects have been noted in various studies of water quality of Wightman Fork and the Alamosa River.

1.5.1.2 Water Containing Cyanide

Commercially manufactured sodium cyanide (NaCN) was used at the Site for extracting precious metals from ore grade materials. Cyanide has been used for this purpose in the mining industry since the late 1800's. Cyanide is found either in simple form or in combination with other elements. Simple cyanide forms designated as "free" cyanide are the cyanide radical, CN-, and hydrogen cyanide, HCN. Cyanide also combines or complexes with alkali metal ions, heavy metal ions, and transition elements. The complex cyanide bonding is very strong, moderately strong, or weak (defined by tendency to disassociate in an acidic environment). Presence of excess hydrogen ions (acid) will lead to the formation of HCN, depending on the strength of the metal/cyanide bond.

Cyanide content is found in residual process water contained in the HLP. The predominant form of cyanide in solution is a Weak Acid Dissociable (WAD) complex (complex that has a moderately strong bond and dissociates at a pH of 4.5 or greater) with copper. Complexes with other elements - silver, sulfur, gold, iron and others - are also present. Thiocyanate (SCN) is present in significant quantities. The thiocyanates may migrate through the water treatment train into Wightman Fork. The pH of contained residual process water within the HLP averages about 9.3.

Leaks in the HLP containment liner result in the presence of cyanide in drainage that surfaces downgradient of the HLP. These drainage streams (from the Valley Center Drain, and several seeps in and below HLP Dike 1) are mixtures of residual process water, AMD, and ground water. The AMD portion results in low pH (2.5 - 3.5), and cyanide exists as either a metal/cyanide complex (primarily with copper), or as free cyanide (HCN). These streams are routed to the French Drain Sump to prevent release to Wightman Fork and Alamosa River drainages. The water is pumped to the HLP and mixed with residual process water, or treated separately.

1.5.1.3 Description of Impacted Water

Tables 1 - 6 summarize data collected during water monitoring before treatment and during discharge of surface water to Wightman Fork. The tables include recordings of copper and cyanide loadings from May 1993 through June 1994. During this period, monitoring emphasis was given to copper and cyanide because these were the chemicals of highest concentration during the ERRA. There was also a concern because of the potential toxicity of cyanide.

Table 1 shows data representing the copper load (lbs.) transported by the Site water. The first group exhibits copper load from water pumped from the French Drain (FD) Sump. This sump contains water from the Valley Center Drain (VCD) and AMD seeps.

The second data group within Table 1 illustrates the copper concentration of water contained in the HLP. This includes water pumped from the FD Sump, water that surfaced at the toe of the CWP, and process water contained in the HLP. All water in the HLP is treated to remove cyanide and copper, as well as other metals, before release to Wightman Fork.

The underground workings section presents data on copper load that was transported by water exiting from the Reynolds Adit and the Chandler Adit. Also shown is the amount of copper removed through treatment at the Portable Interim Treatment System (PITS). The PITS treated water exiting the Reynolds Adit, the Iowa Adit, and some contaminant surface runoff. The plant was deactivated after the Reynolds Actit plug was completed.

The remaining sections of the table present the copper content of surface water discharged into Wightman Fork during this time period. These include water from Cropsy Creek, seep LPD-2 (which feeds into Cropsy Creek), and Pond P-4 (a sediment pond that receives surface runoff from the mine pit area, haul roads, and other runoff). Other streams that contributed copper load to Wightman Fork include drainage from the Summitville Dam Impoundment (SDI), the North Pit Waste Dump (NPWD), the Clay Ore Stockpile, and treatment plant effluent.

Also shown are the pounds of copper that would have been added to Wightman Fork if water had flowed into Wightman without treatment. Annual totals from July 1993 to June 1994 are given to the right of monthly totals. The twelve month period, July 1993 through June 1994, represents the time frame when existing treatment facilities utilized maximum capacity.

Table 2 shows monitored cyanide loading (lbs.) or the potential for cyanide loading to Wightman Fork during the same period.

Table 3a shows monitored flow rate for streams which are capable of carrying contaminant load to Wightman Fork. High and low flow rates illustrate seasonal fluctuations. Combined monthly totals illustrate potentially required treatment volumes.

Table 3b shows the total gallons for streams capable of carrying contaminant load to Wightman Fork. This table also shows the treatment plant capacity measured in total gallons.

Table 4 shows other monitored constituents (manganese and iron) that should be taken into consideration in the selection of treatment processes. Manganese removal to <1 mg/liter is necessary before cyanide destruction can take place. Significant iron content can produce sludge volumes that affect plant efficiency.

Tables 5 and 6 show copper and cyanide concentrations monitored at station WF 5.5 on Wightman Fork from May 1993 through June 1994.

General descriptions of monitored surface water affected by conditions at the Site are given below. Figure 4 shows contaminated surface water streams.

Stream A - The Valley Center Drain (VCD)

General: Comprised of drainage from the CWP, ground water from beneath the HLP, and leakage from HLP containment. Contains cyanide as a result of leakage from the HLP. CWP drainage contributes low pH and elevated metals.

Volume: Significant flow throughout the year. Peak flow is concurrent with spring snowmelt. High flow (78 gpm) recorded in April 1994; low flow (57 gpm) was recorded in June 1993.

Loading: Based on copper as the indicator, the VCD ranked as the 4th highest peak flow carrier of metals. 8,473 lbs. of copper dissolved in solution were transported by drainage from July 1993 through June 1994.

Stream B - Cropsy Waste Pile Drainage

General: Comprised of ground water flow from seeps and upgradient drainage through colluvium and alluvium (Geraghty & Miller, 1992). Includes precipitation (snowmelt and rain fall) infiltrating through mine waste materials. Significant aluminum content effects must be considered when selecting a treatment process. Volume and makeup are expected to materially change with planned relocation of CWP materials.

Volume: Seasonal release to the surface at the toe of the CWP. Year round contribution to the VCD. High flow (364 gpm) recorded in May 1993. Surface flow was not observed at the toe of the CWP between January - April 1994.

Loading: Based on copper as the indicator, water surfacing at the toe of the CWP is the second highest peak carrier of metals. 23,305 lbs. of copper dissolved in solution were transported by drainage from July 1993 through June 1994 (includes water sent to the CWTP).

Stream C - Drainage from Underground Workings

General: Comprised of ground water and precipitation (snowmelt and rainfall) infiltrating the mine pit area. These infiltrating waters ing through mineralized rock into the remaining underground workings have historically surfaced as flow from the Reynolds Adit. Comparatively less water volume drains from the Iowa Adit. The Reynolds and Chandler adits have been plugged. The long-term effects of plugging the Reynolds Adit in February 1994 and Chandler Adit in March 1994, and the consequent rise in the South Mountain water table have not been determined. In May 1994, an AMD stream developed as discharge from the Chandler Adit. It has been observed that the water is flowing between the top of the plug and the roof of the adit (Abel, pers. comm, 1994). Peak flow from the Chandler Adit leak in June 1994 was 661 gpm with a copper concentration of 409.40 mg/l and a pH of 2.16, determined by sampling the stream just outside the adit entrance. This was almost "instantaneous" (the discharge increased from 0 gpm to 661 gpm in 11 days), indicating a direct relationship between the rise in the South Mountain water table and the filling of the adit system with water. By the end of July 1994, the flow of the AMD stream decreased to 130 gpm with a copper content of 268 mg/l and a pH of 2.30. Eventual volume of AMD that may require treatment is unknown. Corrective measures are planned.

Volume: Significant flow throughout the year. High flow from the Reynolds Adit (763 gpm) was recorded in June 1993; low flow from the Reynolds Adit (6 gpm) was recorded in April 1994.

Loading: Based on copper as the indicator, Stream C is ranked as the highest peak flow carrier of metals. 198,221 pounds of copper dissolved in solution were transported by drainage from July 1993 through June 1994. Peak flow of AMD from the underground workings in June 1994 was 14% less than flow in June 1993. Copper load from underground workings in June 1994 was approximately 23% less than the load in June 1993 (Table 4). In July 1994 volume from the underground workings was 25% less than in July 1993. Copper load from underground workings in July 1994 was 15% less than in July 1993.

Stream D - Summitville Dam Impoundment and Beaver Mud Dump drainage

General: Comprised of the surface drainage into the tailings pond and surrounding area, and the ground water migration through the mud dump. Possible ground water migration through tailings contained in the pond. Includes precipitation (snowmelt and rainfall) infiltrating through BMD materials. Volume and makeup of this stream is expected to materially change with planned solid waste relocation in 1994-95 (Cropsy Phase II operations).

Volume: High flow (202 gpm) was recorded in May 1993; low flow (33 gpm) was recorded in November 1993. Monitoring was not possible from January 1994 through April 1994, due to snowpack.

Loading: Based on copper as the indicator, Stream D is ranked as the third highest peak flow carrier of metals. 12,294 lbs. of copper dissolved in solution were transported by drainage from July 1993 through June 1994.

Stream E - North Pit Wayte Dump drainage

General: Comprised primarily of surface runoff from waste dump materials. There is some ground water seepage.

Volume: Significantly varies with precipitation (rainfall and snowmelt). Affected by spring runoff. High flow (284 gpm) was recorded in May 1993; low flow (1 gpm) was recorded in October 1993. Monitoring was not possible from November 1993 through April 1994, due to snowpack.

Loading: Based on copper as the indicator, Stream E is ranked as the 6th highest peak flow carrier of metals. 4,321 lbs. of copper dissolved in solution were transported by drainage from July 1993 through June 1994.

Stream F - Clay Ore Stockpile Drainage

General: Comprised of surface drainage migration through lower portions of the waste dump and precipitation (snowmelt and rainfall) infiltrating through upper level materials. Water migrating from beneath the CWP may also contribute.

Volume: High flow (66 gpm) was recorded in June 1993; low flow (37 gpm) was recorded in May 1994.

Loading: Based on copper as the indicator, Stream F is ranked as the 8th highest peak flow carrier of metals. 1,113 lbs. of copper dissolved in solution were transported by drainage from July 1993 through June 1994.

Stream G - Sediment pond P-4 drainage

General: Comprised of surface drainage from upgradient disturbed areas. Includes some contribution from Iowa adit drainage.

Volume: Highly variable, dependent on precipitation events. High flow (948 gpm) was recorded in May 1994; low flow (4 gpm) was recorded in November 1993.

Loading: Based on copper as the indicator, Stream G is ranked as the 5th highest peak flow carrier of metals. 4,508 lbs. of copper dissolved in solution were transported by drainage from July 1993 through June 1994.

Stream H - Drainage from Cropsy Creek

General: Comprised of surface drainage from upgradient undisturbed areas. Rerouted around the CWP and HLP areas during SCMCI operations. Receives some metals loading from surface runoff from the Cropsy Waste Pile and seep LPD-2, downgradient from the HLP and Dike 1. May receive loadings from effected ground water. Route does not go through sediment control features.

Volume: Peak flow is concurrent with spring runoff. Significantly affected by precipitation (snowmelt and rainfall). High flow was recorded in May 1993; low flow was recorded in February 1994.

Loading: Based on copper as the indicator, Stream H is ranked as the 7th highest peak flow carrier of metals. 1,737 lbs. of copper dissolved in solution were transported by drainage from July 1993 through June 1994.

The affected stream segments are summarized in the following table. The streams are ranked in decreasing order according to the metal load during peak flow.

Ranking of Surface Water Streams at Peak Flow
without Operation of CWTP, CDP and MRP

Metal Load at Peak Flow*	Stream**
1	Stream C- Underground Workings Drainage
2	Stream B- CWP Drainage
3	Stream D- SDI/BMD Drainage
4	Stream A- VCD
5	Stream G- P-4 Drainage
6	Stream E- NPWD Drainage
7	Stream H- Cropsy Creek Drainage
8	Stream F- Clay Ore Stockpile Drainage

*   Rankings are listed in decreasing order.
**   Table does not include the HLP wastewater stream.

French Drain Sump Inflows

The FD Sump was originally constructed to prevent drainage from the Valley Center Drain (Stream A) from entering the Cropsy Creek and Wightman Fork. A collection and pumping facility was installed after VCD drainage was found to contain cyanide. The sump was also utilized to contain other contaminated water. These drainages (described below) were found to be contaminated in later years. Tables 1 - 3b summarize data for copper, cyanide, and water volume for these streams. General descriptions follow.

FD Sump -1 Seepage from Dike 1

General: Comprised of water exiting a point at the base of Dike 1.

Volume: Peak volume (1,785,600 gal., June 1993) is concurrent with spring snowmelt.

Loading: At peak flow, Stream FD Sump-1 transports up to 83 lbs of copper per day. Load declines to less than 3 lbs per day as flow decreases.

FD Sump -2 Seepage from the Dike 1 ramp

General: Comprised of water exiting a point on the access road that flanks Dike 1.

Volume: Peak volume (820,000 gal. in June 1993) is concurrent with spring snowmelt. Flow ceases soon after the peak snowmelt period. Water is acidic, and contains cyanide.

Loading: At peak flow, Stream FD Sump-2 transports up to 5.7 lbs of copper per day. Load declines to less than 1 lb. per day as flow decreases.

FD Sump -3 Drainage from beneath the HLP

General: Comprised of water exiting rock drains built to divert water during HLP construction at 11,510 and 11,530 elevations. Discharges are combined and routed to the FD Sump. There is a wide range in copper content. Contains a slight amount (0.12 mg/l) of cyanide at peak volume discharge.

Volume: Peak volume (1,116,000 gal. in June, 1993) is concurrent with spring snowmelt. Significant flow continues throughout the year.

Loading: At peak flow, Stream FD Sump-3 transports up to 27 lbs of copper per day. Load declines to less than 1 lb. per day as flow decreases.

1.5.2 Contaminant Transport and Migration

1.5.2.1 Surface Water

Surface water is considered the most significant media for off-site transport of metals. Surface water has been impacted by mining operations from the Site throughout the reach of Wightman Fork, from the Site to the Alamosa River, and within the Alamosa River from Wightman Fork to Terrace Reservoir and points further downstream. According to the Conceptual Sitewide Remediation Plan prepared for the EPA, it has been determined that the Site is the predominant source of metals loading to the Alamosa River system.

As pH of water rises from the addition of water with higher pH, iron precipitates from solution as a hydrated iron (III) oxide product (ferric hydroxide). This forms the red or yellow staining seen on rocks in the streams or on banks. Copper, cadmium and zinc will co-precipitate with iron precipitates. Metals concentrations are further reduced by dilution from downstream tributaries. COPC could be biologically transported through an aquatic food chain, and could be transported to birds, animals and humans. The Baseline Risk Assessment (BRA) has not been completed; however, qualitative risk analysis has been performed by EPA which verifies this data (ERT, 1993). The BRA is scheduled for completion in 1995. Currently, the full range of COPC's is being reassessed and additional contaminants of concern (COC) may be identified in the BRA.

1.5.2.2 Ground water

Ground water depths vary at the Site. In general, water levels are relatively close to the surface except in the vicinity of the old mine workings where depth to water can be as much as 300 feet. The old workings act as effective underdrains. This can be seen by the flow of water from the adits. It is anticipated that the ground water level will rise as water backs up behind the plugged Reynolds and Chandler Adits.

The ground water occurs in surficial deposits consisting of colluvium, alluvium, and/or glacial moraine; and fractured andesite of the Summitville Formation. Ground water flow is within the weathered and fractured bedrock and, within alluvium near the Cropsy Creek and Wightman Fork channels. Ground water flow and metals are capable of being transmitted to Wightman Fork through the alluvial and bedrock systems. Ground water is generally shallow (0.2 to 25 feet within the alluvium) and flows northeast in both the Cropsy and Wightman Fork drainages.

Shallow ground water at the Site is present as a series of intermittent perched systems. The perched aquifer system contributes to recharge of the shallow fractured bedrock system. No regional ground water table has been identified at the Site. The ground water close to the surface is strongly influenced by precipitation. During spring runoff, these shallow systems discharge to surface water. Numerous springs and seeps are evident throughout the Site and most flow in direct response to precipitation.

1.5.2.3 Soil and Air

Site cover consists of topsoil, silt, clays, and gravel. The topsoil is described as grey/brown/orange, non-plastic with a trace of roots and sand. The clays are low to medium plasticity, with some gravel. The gravel is indicative of colluvial deposits or tailings. The disruption of the surface soils may be a secondary source of excess metals migration.

1.5.3 Heap Leach Pad

The HLP is approximately 73 acres in size and 200 feet deep at its lowest point (Figure 3). The HLP consists of 6,700,000 cubic yards of ore containing high levels of metallic sulfides within a reservoir of cyanide and heavy metals contaminated water. Approximately 100 million gallons of leachate remains in this reservoir. The Cropsy Creek was diverted around the HLP area and the HLP was then constructed in the former Cropsy Creek drainage bed. The HLP was originally constructed with an underliner system consisting of approximately 6 liners. The HLP is underlain by a French Drain system and extends onto the toe of the CWP which is located upgradient within the Cropsy Creek drainage bed. The HLP liners have been leaking, causing water within the French Drain to become contaminated with cyanide and metals.

1.5.4 ARARs

ARARs are "applicable" or "relevant and appropriate" requirements of federal or state law which address a hazardous substance, pollutant, contaminant, remedial action, location or other circumstance found at a CERCLA Site. Refer to Table 7 for a detailed summary and discussion of ARARs. The NCP defines "applicable" requirements as cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under Federal or State law that specifically address a hazardous substance, pollutant, contaminant, remedial action location or other circumstance found at a CERCLA site. "Relevant and appropriate" requirements address problems or situations sufficiently similar to those encountered at the CERCLA site that their use is well suited to the environmental or technical factors at a particular site. (See 40 CFR Section 300.5.)

ARARs are grouped into three categories:

- Chemical Specific
- Action Specific
- Location Specific

Chemical specific ARARs include health or risk based narrative standards, numerical values, or methodologies that, when applied to site-specific conditions establish the acceptable amount or concentration of a chemical that may remain or can be released to the environment. Action specific ARARs are usually technology or activity-based requirements or limitations on actions taken with respect to hazardous substances found at CERCLA sites. Location specific ARARs are restrictions placed on the concentration of hazardous substances or the conduct of activities solely because they occur in special locations. Examples of special locations include floodplains, wetlands, historic places and sensitive ecosystems or habitats. (See "CERCLA Compliance with Other Laws Manual Draft Guidance," EPA/540/G-89/006 August 1988.)

In addition, the NCP has identified a fourth category of information "to be considered" when evaluating remedial alternatives, known as TBCs. TBCs represent Federal and State advisories, criteria or guidance that are not ARARs, but are useful in developing CERCLA remedies. (See 40 CFR 300.430(g)(3).)

The analysis of ARARs has been limited to the scope of the interim action. The NCP allows waiver of ARARs for interim remedial measures that do not exacerbate site problems or interfere with final remedy (40 CFR 300.430(f)(1)(ii)(C)(1) and 55 FR 8747). Other ARARs may be involved in enacting final remedy(ies).

In response to comments submitted during the public participation process on the HLP FFS and Proposed Plan, EPA is further defining the portions of applicable or relevant and appropriate requirements from Federal and State laws or regulations which must be met by any alternative implemented as the HLP interim remedial action. Since the ARARs for the HLP were identified in the "ARARs Addendum to the HLP Focused Feasibility Study Report", this further refinement of ARARs presents only a minor change to the HLP FFS and Proposed Plan. Consistent with its "Interim Final Guidance on Preparing Superfund Decision Documents", OSWER Directive 9355.3-02 (June 1989), EPA has determined that this minor change will have little or no impact on the overall scope, performance, or cost of each alternative as originally presented in the HLP FFS or Proposed Plan.

The following relevant portions of the HLP ARARs must be met in accordance with Section 121(e) of CERCLA and 40 C.F.R 300.430 of the NCP by each potential HLP interim remedial action alternative:

1.5.4.1 Chemical Specific ARARs

Surface Water ARARs

The Colorado Water Quality Standards (CWQS) establish a system for classifying state surface waters and procedures and criteria for assigning numeric water quality standards. (See 5 CCR 1002-8, Sections 3.1.0 through 3.1.17.)

- Colorado Water Quality Standards, Applicable

  Criteria for Stream Classification

The CWQS require that surface waters be:

> classified for the present beneficial uses of the water, or the beneficial uses that may be reasonably expected in the future for which the water is suitable in its present condition or the beneficial uses for which it is to become suitable as a goal.... Where the use classification is based upon a future use for which the waters are to become suitable, the numeric standards assigned to such waters to

> protect the use classification may require a temporary modification to the underlying numeric standard... (See §3.1.6.)

The CWQS employ four broad types of beneficial use to frame the classification process:

- recreational
- aquatic life
- agriculture
- domestic water supply

Recreational Use

The recreational uses are divided into two classifications. Recreational Use, Class 1 - Primary Contact, addresses surface water quality concerns where ingestion of small quantities of water during the use is likely to occur. Recreational Use, Class 2 - Secondary Contact, focuses on streamside activities where ingestion of water is unlikely to occur. The effect of the recreation classification on numeric water quality criteria is limited, the primary consideration being the concentration of fecal coliform bacteria. The Summitville Minesite is unlikely to contribute bacterial contamination to the watershed. For that reason, the recreational use classifications will not be considered further.

Aquatic Life

Two aquatic life classifications are currently promulgated for stream segments of interest. Class 1 cold water aquatic life is defined as:

> ...waters that (1) currently are capable of sustaining a wide variety of cold water biota, including sensitive species, or (2) could sustain such biota but for correctable water quality conditions. Waters shall be considered capable of sustaining such biota where physical habitat, water flows or levels, and water quality conditions result in no substantial impairment of the abundance and diversity of species. (See §3.1.13(1)(c)(i).)

Class 2 cold and warm water aquatic life is defined as:

> ...waters that are not capable of sustaining a wide variety of cold or warm water biota, including sensitive species, due to physical habitat, water flows or levels, or uncorrectable water quality conditions that result in substantial impairment of the abundance and diversity of species. (See §3.1.13(1)(c)(iii).)

Domestic Water Supply

Domestic water supply is defined as:

> ...suitable or intended to become suitable for potable water supplies. standard treatment...these waters will meet Colorado drinking water regulations... (See §3.1.13(1)(d), emphasis added.)

Agricultural Use

Agricultural use is defined as:

> ...suitable or intended to become suitable for irrigation of crops usually grown in Colorado and which are not hazardous as drinking water for livestock... (See §3.1.13(1)(b).)

Three segments of the Alamosa River are classified for various uses according to this system: Segment 6, the Wightman Fork at and below the mine; Segment 3b, the Alamosa River from immediately above the confluence with Wightman Fork to Terrace Reservoir; and Segment 8, Terrace Reservoir. Figure 5 shows segments of the Alamosa River Basin.

Segment 6 is classified for Recreation Class 2 and Agriculture. It is not classified for aquatic life. No numeric water quality standards have been assigned. The lack of an aquatic life classification was based on testimony received at the Colorado Water Quality Control Commission (WQCC) hearing. The WQCC determined that an aquatic life classification cannot be attained within 20 years.

Segment 3b is classified as Class 1 Cold Water Aquatic Life. Numeric Standards are set for surface water downstream of the confluence of Wightman Fork and the Alamosa River.

Terrace Reservoir is classified as Class 2 Cold Water Aquatic Life. This classification recognizes a limit on the ability of Terrace Reservoir to sustain a diverse aquatic community.

Numeric Water Quality Standards

The CWQS provides a three-tiered structure for establishing numeric water quality standards. For unimpacted high quality waters, numeric levels known as the "Table Value Standards" (TVS) are established and presumed to be protective. For impacted waters where pollutant concentrations exceed TVS values but the beneficial uses are adequately protected, Ambient Quality-Based Standards can be adopted. For impacted waters where beneficial uses are not currently adequately protected, TVS are adopted as a goal. Temporary modifications to numeric standards may be adopted in these areas. Where classified uses are not being protected and a use attainability analysis has found nonattainability, Site-Specific-Criteria-Based Standards can be developed. The TVS and Ambient Quality-Based Standards are applicable regulations for determining compliance with surface water discharges at the Site. Segment 3b of the Alamosa River is downstream of the Site at the confluence of the Wightman Fork and the Alamosa River. These regulations were used to establish promulgated standards in this segment of the Alamosa River. Specifically, the Classifications and Numeric Standards for Rio Grande Basin are found in Section 3.6.6. of the regulation. Table 8 illustrates these levels. These standards are categorized into acute and chronic limits. Acute limits represent an upper level not to be exceeded in any 24 hour period. Chronic standards are average levels which can not be exceeded in a 30 day period.

Table Value Standards

The TVS are based upon the Federal Water Quality Criteria. The TVS, however, have been adjusted to protect the beneficial uses of Colorado waters (See §3.1.7(b)(i)). The TVS for aluminum (acute), arsenic (acute), lead (acute/chronic), nickel (acute/chronic), selenium (acute/chronic), silver (acute/chronic), zinc (acute/chronic), chromium VI (acute/chronic), chromium lII (acute), mercury (chronic), manganese (chronic), cadmium (acute/chronic), pH, dissolved oxygen, Fecal Coli, ammonia, chlorine, sulfide, boron, nitrate and cyanide are set at Segment 3b. It is important to note that many of the TVS for protection of aquatic life from metal pollutants are hardness dependent. The WQCC has adopted an acute and a chronic copper standard for Segment 3b. The acute copper standard for Segment 3b is established using the TVS; however, the WQCC has adopted a less stringent temporary modification to this standard based upon WQCC hearing testimony. The EPA has adopted and will meet the ambient quality based chronic copper standard as applicable for this interim action and is not using the less stringent acute copper standards from the TVS or the less stringent August 1994 temporary modification. The interim action levels (IALs), as monitored at WF-5.5, were developed to meet the more stringent ambient quality-based chronic copper standard at Segment 3b.

Ambient Quality-based Standards

Ambient quality-based numeric surface water quality standards are the mechanism where limited water quality impacts are controlled through less stringent water quality standards. Ambient quality-based standards are specifically intended to address circumstances where natural or irreversible man-induced ambient water quality levels are higher than the specific numeric levels contained in the TVS Tables I, II, and III, but are determined "adequate to protect classified uses." (See §3.1.7(1)(b)(ii).) The chronic standard for copper is established at Segment 3b using this regulation. Copper is one of the primary contaminants of concern for water quality. The chronic copper standard was used as the most strict ARAR for copper at the Site. The IALs were developed using this standard. The chronic standard for iron also falls into ambient water quality standards. There are no acute iron standards.

To evaluate the ability of alternatives to meet the stream classification and numerical standard of the CWQS ARARs, EPA established IALs for water quality. These IAL can be found at page 23 of the Water Treatment FFS. The IAL are developed using a model which utilized high flow and low flow average concentrations of the contaminants to set threshold loadings allowable at Wightman Fork monitoring point 5.5. Numerical standards that would enable the river water quality to meet the water quality ARAR at Segment 3b under average conditions were then calculated. Based upon the WQCC numeric water quality standards for Segment 3b, the TVS levels were used for all COPC at the Site with the exception of copper and iron. EPA used the WQCC ambient quality standard for copper and iron. The ambient level for copper is 30 ug/l based upon the 85th percentile ambient data in Segment 3a. The methodology used to develop these levels is similar to the criteria applied in the development of the numeric criteria levels (NCL), that is, back modeling the contaminant loading from the promulgated ARARs at the Alamosa River. These IAL are formally adopted as remedial goals in the IRODs.

The discharge monitoring point, WF-5.5, is the interim monitoring point for the Site, and the IAL are the interim water quality standards during this remedial action five year period. It is important to note that the IALs are not "interim" due to their inability meet ARARs; rather, EPA believes that these ARAR-derived limits at the point of compliance do attain the numerical standards at Segment 3b. The ability of the IAL to achieve the applicable water quality standards, however, will be reassessed by EPA upon the completion of the quantified Risk Assessment and the State of Colorado use-attainability study. The results of these efforts will be incorporated into a final remedy.

- Federal Water Quality Criteria, Applicable

The preamble to the proposed NCP states:

> (a) State numerical WQS is essentially a site-specific adaptation of a Federal Water Quality Criteria (FWQC), subject to EPA approval, and, when available, is generally the appropriate standard for the specific body of water." (See 53 FR 51442, right colum, top.)

As noted above, the FWQC would only be applicable in the absence of current, segment specific CWQS. In this circumstance, current, segment specific CWQS are available and will be applied as the surface water quality ARARs for the Site. The FWQC are considered applicable since this ARAR establishes the basis for the State of Colorado's numerical standards.

<u>Ground Water ARARs</u>

The Colorado Ground Water Standards (CGWSs) provide for identification of specified ground water areas, classification of the specified areas, and numeric ground water quality standards.

5 CCR 1002-8 establishes a system for classifying ground water and adjusting water quality standards to protect existing and potential beneficial uses. The ground water classifications are applied to "specified areas," a concept identified in the definitions and explained in Section 3.11.4(C)(1). Those ground waters not classified as within "specified areas" may be subject to Statewide radioactive material standards listed in Section 3.11.5(C)(2) of the Basic Standards of Ground Water, 3.11.0 (5 CCR 1002-8) and organic standards identified in Table A of Section 3.11.5(C).

Since the Colorado Water Quality Commission has yet to classify the Site as a "specified area," there are no currently applicable or relevant and appropriate Colorado Ground Water numeric standards for the Site. However, since the publication of the WTFFS, the Colorado Water Quality Control Commission has adopted an interim narrative standard for all unclassified ground waters of the State that supplements the Statewide standards for radioactive materials and organic pollutants established in Section 3.11.5(C) of the Basic Standards for Ground Water. This narrative standard requires that ground water quality be maintained for each parameter at whichever of the following levels is less restrictive:

> (i) existing ambient water quality as of January 31, 1994, or
>
> (ii) that quality which meets the most stringent criteria set forth in Tables 1 through 4 of "The Basic Standards for Ground Water."

Ambient water quality is established by agencies "with authority to implement this standard" using "their best professional judgement as to what constitutes adequate information to determine or estimate existing ambient quality, taking into account the location, sampling date, and quality of all data available" prior to January 31, 1994. Based on Rule 1, Section 1.1(5) of the Mineral Rules and Regulations, EPA believes the Mined Land Reclamation Board (MLRB) is the agency that has the primary authority to implement the narrative standard for ground water at the Summitville Site. MLRB and WQCD established NCLs for surface and ground water quality at the Summitville Site in SCMCI's operating permit, as well as its 1991 Settlement Agreement between SCMCI and the State of Colorado. These NCLs are not applicable or relevant and appropriate, since they are not legally binding, promulgated regulations. However, these standards have been considered by EPA in establishing its interim action levels for water quality because they provide useful information or recommended procedures in addressing the interconnected ground water and surface water at the Site.

This interim ground water narrative standard, since it became effective on August 30, 1994, was not identified as an ARAR in any of the FFSs for the Site. However, since compliance with this ground water ARAR will have little or no impact on the overall scope, performance or cost of the alternatives evaluated, inclusion of this ARAR represents only a minor change to the FFS and Proposed Plan. See "Interim Final Guidance on Preparing Superfund Decision Documents," OSWER Directive 9355.3-02 (June 1989), at p. 5-3.

EPA further expects that once the CWQC completes its use attainability study and classifies Site ground water, the interim narrative ground water standard will be replaced by a "specified area" classification or "site-specific" standard for the Site. This ground water ARAR will be attained by the final remedial action(s) for the Site.

<u>Storm Water Management and Effluent Limitations ARARs</u>

Storm water management is governed by the storm water permitting requirements and the Categorical Standards for Ore Mining and Dressing. Both the storm water permitting program and the categorical standards are as applied pursuant to the Colorado Discharge Permit System. Requirements are collection and treatment of storm waters using the Best Available Technology (BAT) for those storm waters which contact mine waste. In addition, both regulatory programs require implementation of Site-specific Best Management Practices (BMP). The BMP emphasize storm water diversion and land/soil reclamation to minimize the contact of storm water with mine wastes.

- Copper, Lead, Zinc, Gold, Silver and Molybdenum Ores Subcategory Effluent Limitations, Relevant and Appropriate

This ARAR applies to "process waste waters" only. Process waters are defined in 40 CFR 401.11(q) as:

> "any waters which, during manufacturing or processing, comes into direct contact with or results from the production of any raw material, intermediate product, finished product, by-product, or waste product."

Thee effluent limitations found in 40 CFR 440.103 would be appropriate and relevant to the Water Treatment IFS activities but not applicable because the discharges are not "process waste waters." The IAL established by EPA to meet the surface water quality ARARs are more stringent than these categorical effluent limitations.

- Colorado Discharge Permit System Regulations/Federal Storm Water Permitting Requirements

Colorado's authority to require permits for the discharge of pollutants from any point source into waters of the state are derived from the Federal National Pollutant Discharge Elimination System (NPDES) regulations. See 40 CFR Part 122. Colorado's NPDES based program can be found in the Colorado Discharge Permit System Regulations (CDPSR). The CWQCC Division Permit issued for the treatment plant at the Site (CDP #CO-0041947), dated November 12, 1991, is the CDPSR document for the Site. Additional permit modification activities are documented in the July 1991 Settlement Agreement and the July 1992 Amendment to the Settlement Agreement.

Storm water is defined in NPDES program as "storm water runoff, surface runoff, snow melt runoff, and surface runoff and drainage." (See 40 CFR 122.26(b)(13).) A permit application is required for active and inactive mining sites where an owner can be identified and when discharges of storm water runoff from mining operations come into contact with any overburden, raw material, intermediate product, finished product, by product, waste product or areas where tailing have been removed. (See 122.26(b)(14)(iii).) As such, the substantive NPDES Storm Water permit requirements are applicable to discernable surface flows of storm water that contacts waste rock, the crushed ore currently contained in the heap leach pads, wet waste rock (mud), clay ore, or tailings at the Summitville Minesite. Infiltration is not covered by this program. (See 55 FR 47996, left column, center.)

The storm water permit regulations require compliance with Sections 301 and 402 of the Clean Water Act Sections 301 and 402 require use of Best Available Technology to control toxic pollutants, and where necessary, further control to achieve ambient water quality criteria. In addition, the storm water regulations require implementation of stormwater BMP as part of the comprehensive program.

EPA has established effluent limitation guidelines for storm water discharges from the Ore Mining and Dressing category. These effluent limits require application of BAT to the Ore Mining and Dressing category. In those regulations, EPA has defined "mine" broadly and a in manner which coincides with the definition provided in the Storm Water Permit requirements. (See 40 CFR 440.132(g).) The effluent limitation guidelines for Ore Mining and Dressing also provide an exemption for overflow of excess storm water caused by a greater than a 10 year 24 hour precipitation event when a facility has met certain design and operational prerequisites. This exemption remains in effect as part of the new independent storm water permitting program. (See 55 FR 48032, right column, bottom.)

Both the effluent limits and the storm water permitting program require application of BAT and, if necessary, additional controls to meet ambient water quality standards. In addition, both programs require implementation of stormwater BMP. The only jurisdictional distinction is that the Ore Mining and Dressing Category effluent limits are not applicable, but instead relevant and appropriate. The recognition by the storm water permit program of the overflow exemption demonstrates the existing equivalence of the programs. Thus, attainment of the Effluent Guidelines and Standards for Ore Mining and Dressing will ensure attainment of the storm water discharge requirements.

Eight outfalls were identified at the Summitville Minesite which meet the point source discharge requirement for storm water permitting. The discharge from each of these outfalls have been attributed to one of the three categories of precipitation related discharges defined by the storm water regulations. (See 40 C.F.R. 122.26(b)(13); 55 Federal Register at 48065.

Pursuant to the NPDES Storm Water Permitting requirements and in response to obligations under the July 1, 1991 Settlement Agreement and Compliance Plan (the Compliance Plan) for Summitville Mine, a two volume Best Management Practices (BMP) plan dated October 31, 1991 was developed. The Compliance Plan required that the

BMP provide a reclamation plan and implementation schedule that included existing and planned pollution prevention practices. The BMP also evaluated the need for long term treatment of storm water drainage at the facility.

The BMP was designed to minimize or control contact between precipitation and potential sources of pollutants. The BMP developed at the Summitville Minesite including housekeeping, employee training, inspections, preventative maintenance. In addition, reclamation activities such as grading, stabilization, revegetation, erosion control and sediment control were included as part of the BMP. Each of the measures was designed to protect the existing water quality and quantity during the operation phase and upon closure of the Summitville Mine.

The existing BMP plan which is currently being implemented at the Site and will continue to be implemented regardless of which alternative is selected, attains compliance with the NPDES stormwater and categorical point source standards.

1.5.4.2 Action Specific ARARs

RCRA Subtitle C

40 CFR 261.4(b)(7) specifically excludes "solid waste from the extraction, benification and processing of ores and minerals..." from the rules governing management of hazardous waste in RCRA Subtitle C. Mine wastes present at the Summitville Minesite, including waste rock, the crushed ore currently contained in the heap leach pads, wet waste rock (mud), clay ore, and tailings, were generated as a result of the extraction, processing or benification of ores and minerals. Accordingly, RCRA Subtide C is not applicable to the remediation of this mine waste.

RCRA Subtitle C may be relevant and appropriate to actions at the Summitville Minesite if the mine waste materials are sufficiently similar to RCRA hazardous waste, particularly if the subject wastes fail the Toxicity Characteristics Leachibility Procedure (TCLP) or exhibit other characteristics of RCRA hazardous wastes (i.e, low pH). See, "Superfund Guide to RCRA Management Requirements for Mineral Processing Wastes, 2nd Edition," OERR Directive 9347.3a-12 (August 1991).

Further, if the disposal activity involves the use of a waste management unit sufficiently similar to a RCRA regulated unit, and the unit is to receive wastes sufficiently similar to RCRA hazardous wastes, the RCRA Subtitle C requirements pertaining to that type of waste management unit would be relevant and appropriate. (See 55 FR 87630.)

The EPA has stated, when describing its overall liquids management strategy for RCRA Subtitle C land disposal units:

> as described in the preamble to the minimum technology regulations (47 FR 32274, July 26, 1982 and 51 FR 10706, March 28, 1986), the Agency's general strategy for such units is to impose design and operation requirements to minimize leachate generation (i.e., caps and prohibition on liquids in landfills) and then to require removal of the leachate before liquids migrate into the environment. (See 52 FR 8712.)

Given the acid and contaminated leachate generating potential of the materials found at the CWP, BMD, SDI and Mine Pits portions of the Site, EPA determined that the wastes are sufficiently similar to hazardous wastes to warrant imposition of selected portions of RCRA Subtitle C requirements. The Subpart L Waste Pile closure requirements, Subpart K Surface Impoundment closure requirements and Subpart N Landfill closure requirements are therefore relevant and appropriate to the closure of the CWP, BMD, SDI and Mine Pits. Accordingly, following placement of the materials in the Mine Pits, the unit must be closed in a manner that attains the following relevant and appropriate requirements:

- provision of a low maintenance cover that minimizes migration of liquids through the closed unit; promotes effective drainage; minimizes cover erosion; and is capable of accommodating settling and subsidence (See 40 CFR 264.310(a), 2642.28(a), 264.258(b); and

- provision for long term maintenance of the cover, continued operation of the leachate collection system and continued control of run-on and run-off (See 40 CFR 264.310(b), 264.228(b), 264.258(b).

Colorado Mined Land Reclamation Act

The Colorado Mined Land Reclamation (MLR) regulations at 2 CCR 407-1 require the reclamation of mined areas. The MLR regulations provide specific reclamation criteria which are applicable to the Summitville Minesite. In particular, Rule 3 of the Mineral Rules and Regulations of the Colorado Mined Land Reclamation Board is applicable to the remedial action being implemented at the CWP. The remedial alternatives must attain the requirements for reclamation measures and the reclamation performance standards found in §§ 3.1.5 (Reclamation Measures - Materials Handling), 3.1.9 (Topsoiling), and 3.1.10 (Revegetation). The general water (§3.1.6), ground water (§3.1.7), wildlife (§3.1.8) and building and structures (§3.1.11) requirements, while also applicable to the CWP interim remedial action, will be met with the attainment of other federal or state ARARs which provide more stringent standards for the same subject matters.

The conditions imposed by the Colorado MLR Permit #M-84-157 for the Summitville Mine stipulated a phased approach to land reclamation which minimizes the total disturbed area at any point in time. When mining activities in each area have been completed and the sections no longer needed, the permit requires that all land associated with waste dumps, leach heaps, roads, mine pits and plant facilities be reclaimed for forage and timber use. Reclamation activities at the Summitville Minesite will emphasize surface soil stabilization (to include grading, top soil management, and revegetation), preservation of water quantity and quality, and concern for the safety, and protection of wildlife.

The reclamation requirements of the MLR are ARARs, not the site specific MLR reclamation plan. Regardless, the existing MLR reclamation plan does represent the site specific application of the MLR and is, therefore, a to-be considered from an ARAR perspective.

Clean Air Act

Federal and state ARARs were identified for common and generation of particulate matter (PM10) at the Site. An emission permit will be required temporary construction activities exceed two years. (See 5CCR 1001, §3(I)(B)(3)(e).) Control measures to minimize dust and air monitoring will be implemented if necessary during remedial construction activities. Regulation 1 of the Colorado Air Pollution Control Regulations requires all sources of particulate emissions to utilize technically feasible and economically reasonable control measles. This requirement is applicable to remedial activities that produce fugitive particulate emissions at the Site.

An air pollution permit was applied for at Summitville Minesite for the emission of hydrogen cyanide as a stationary source. The permit included a description of the cyanide heap leach pad process at the Summitville Mine and all associated process chemistry. Permit # 92-RG-653 was given an exempt status in September 1992. The Summitville Site claimed uncontrolled emissions of less than one ton per year and no emissions of hazardous, odorous or toxic pollutants and was, therefore, exempt. (See 5 CCR Section 3(II)(C)(1)(j).) Thus, this particular requirement is not applicable or relevant and appropriate at the Site.

<u>1.5.4.3 Location Specific ARARs</u>

National Historical Preservation Act

The National Historic Preservation Act (NHPA) requires federal agencies to account for the effects any federally assisted undertaking on districts, sites, buildings, structures of objects that are included on the National Register of Historic Places. Executive Order 11593 also requires consideration of the cultural environment. Similarly, the Colorado Register of Historic Places establishes requirements for protection of properties of state historical interest. In addition, the Historic and Archeological Data Preservation Act of 1974 establishes procedures to preserve historical and archeological data which might be destroyed through alteration of terrain as a result of federal construction projects.

At the Summitville Minesite, an inventory of historic, cultural and archeological resources will be performed. This inventory will serve to identify cultural and historic resources that must be considered during the development, analysis, selection and implementation of a remedy. In addition, the inventory will identify historic and cultural resources that are candidates for inclusion on either the state or national historic registers.

Endangered Species

The Endangered Species Act requires that federal agencies ensure that federal actions will not jeopardize the continued existence of any threatened or endangered species or impact critical habitat. In response, a Preliminary Natural Resource Survey will be performed to identify natural resources, habitat types, endangered or threatened species, and any potential adverse effects or injury to trust resources.

Protection of Floodplains and Wetlands

Executive Order No. 11988 and Executive Order No. 11990 require federal agencies to evaluate the potential adverse effects of proposed actions on floodplains and wetlands, respectively. Floodplains and wetlands potentially subject to adverse impacts from site remedial actions will be inventoried and considered during the analysis, selection and implementation of the remedy.

Clean Water Act - Dredge and Fill Requirements.

Section 404 of the Clean Water Act prohibits the discharge of dredged or fill material into navigable waters, including wetlands. The Section 404 requirements are applicable if any remedial action construction will involve dredged and fill activities.

Fish and Wildlife Coordination Act

The Fish and Wildlife Coordination Act serves to protect fish and wildlife when federal actions result in the control or structural modification to natural streams or water bodies. Federal agencies must develop measures to prevent, mitigate or compensate for project related losses of fish and wildlife. Specifically included are projects involving stream relocation and water diversion structures. If applicable, prior to modification of water bodies, the applicable regulation will be followed.

Colorado Wildlife Act

The act establishes the Colorado Wildlife Commission, provides for wildlife management, and prohibits actions detrimental to wildlife. The act is applicable if wildlife observed at the Site would be adversely impacted by the implementation of the remedial action.

Wildlife Commission Regulations

Chapter 10 of the Colorado Wildlife Commission regulations 92 CCR 406-8, Chapter 100 designates and protects certain endangered or threatened species. The regulation are applicable if endangered or threatened species observed at the Site are adversely impacted by the implementation of the remedial action.

Floodplain Management

The Executive Order on Floodplain Management (No. 11988) and 40 CFR §6.302(b) and Appendix A requires federal agencies to evaluate the potential effects of actions they may take in a floodplain and to avoid, to the maximum extent possible, any adverse impacts associated with direct and indirect development in a floodplain. This requirement may be applicable if the remedial activities take place in a floodplain.

Wetlands Protection

Executive Order on Protection of Wetlands (No. 11990) and 40 CFR §6.302(b) and Appendix A require federal agencies to evaluate the potential effects of actions they may take in wetlands, in order to minimize adverse impacts to wetlands. This requirement is applicable if the remedial activities take place in wetlands.

1.6 Summary of Site Risks

The Human Health and Ecological Risk Assessment for the FFS was conducted using relevant EPA guidance including the Risk Assessment Guidance for Superfund and the Resource Conservation Recovery Act (RCRA) Facility Investigation (RFI) Guidance. This risk assessment was a screening level risk assessment intended to briefly examine risks associated with the HLP.

1.6.1 Screening Ecological Risk Assessment

A Screening Ecological Risk Assessment for the Summitville Minesite was prepared by EPA in April, 1993. The screening ecological risk assessment reviewed the no action alternative to determine if there is an imminent hazard to the Wightman Fork from the site. Copper, zinc, and cyanide were chosen as the COPC for the assessment.

The assessment modeled, measured, and predicted concentrations and loading of copper in Wightman Fork for three scenarios:

- April 1993 conditions (included treatment of HLP contained water and discharge from the Reynolds Adit);

- Cessation of water treatment activities; and

- Catastrophic release of water contained in the HLP that could result from an event such as failure of Dike 1, the downgradient impoundment feature.

Effects of the contaminants on rainbow trout and brook trout were estimated by correlating acute toxicity levels of the contaminants with measured and predicted concentrations. The degree of metals toxicity for aquatic life as affected by the pH and hardness of water was described. Study results of copper concentrations that are toxic to trout at differing water hardnesses were included in the assessment to illustrate the variation of toxic copper concentrations with water hardness (the sum of calcium and magnesium concentration expressed in terms of equivalent calcium carbonate).

The screening ecological risk assessment recommended the following:

- Continuation of Site water treatment prior to discharge and decrease of loading of metals into the stream to State of Colorado NPDES permit levels;

- Reduction of the flow of contaminated ground water through plugging the adits for long-term metal loading reductions to the Wightman Fork;

- Conducting an ecological survey of Wightman Fork to obtain Site specific information to document actual discharge impacts and document recovery of Wightman Fork after remediation; and

- Completion of a baseline risk assessment because the review of the no action alternative produced an unacceptable risk, defined as exceeding the Low Observed Adverse Effect Level (LOAEL).

The screening ecological risk assessment predicts an imminent hazard to the environment and suggests that all appropriate response actions should be undertaken to prevent the adverse effects from continuing to take place. The HLP interim action is intended to stabilize a portion of the Site, prevent further environmental degradation, and achieve significant risk reduction. The HLP interim remedial action will be combined with other actions to address additional sources of contamination.

1.6.2 Environmental Risk Assessment

1.6.2.1 Aquatic Receptors

In general, the potential risks to aquatic organisms posed by an untreated release from the French Drain are predicted to be immediate and pronounced. Chemicals of potential concern in the French Drain exceed acute and chronic surface water goals by several orders of magnitude. Modeling predicts that concentrations of cyanide discharging from Copsy Creek remain acutely toxic until the confluence of the Wightman Fork with the Alamosa River. Furthermore, the concentrations of cyanide would remain at levels in excess of the Colorado TVS in the Alamosa River for some distance below Wightman Fork. The TVS are promulgated, risk based standards developed to protect aquatic life uses.

It is important to note that the Site's impact on pH alone may contribute to toxicity to aquatic organisms, as there is a limited range of pH levels tolerated by aquatic receptors.

Prior to treatment of the Chandler Adit, the Colorado TVS, ARARs in Segment 3b of the Alamosa River, were regularly exceeded for copper, zinc, aluminum, iron and manganese. These exceedences are especially problematic as the hardness-dependent Colorado TVS may underestimate the potential toxicity of metals in the acid drainage (low pH) environment below the HLP. Normally, toxicity is reduced as hardness is increased. However, an underlying assumption of the criteria is that alkalinity increases as hardness increases. This assumption holds for many natural waters, however, at the Summitville Minesite hardness is relatively high and alkalinity is low. Ranges of data collected in 1993 at Station 45.4 from Segment 3b of the Alamosa River are as follows:

Flow Season	Analyte	Maximum	Mean	TVS
May-July	Dissolved Copper	2600µg/L	1084µg/L	30µg/L
October-March	Dissolved Copper	780µg/L	780µg/L	30µg/L
May-July	Dissolved Zinc	450µg/L	301µg/L	230µg/L
October-March	Dissolved Zinc	437µg/L	437µg/L	230µg/L

The Colorado Division of Wildlife, in comments on the proposed ambient water quality standard for the Site, found that a self-maintaining population of brook trout was present in the Alamosa river segment that extends from the confluence of the South Fork of the Alamosa to Summitville in 1987. The population appears to have been eliminated in the intervening years by contamination of the Alamosa River. This contamination was caused by Site operations when waste material was placed in the Alamosa River drainage beginning in 1988. Since this stream segment supported a self-maintaining brook trout fishery prior to the SCMCI's mining operations, this contamination could be reversed through reclamation activities.

1.6.2.2 Terrestrial Wildlife

An untreated release from the French Drain would pose significant risks to bird and mammal populations. Based on the modeled concentrations, risks to terrestrial wildlife from acute and chronic exposures to cyanide would be high along Cropsy Creek and Wightman Fork. The potential for chronic exposure is mitigated by the unsuitable habitats surrounding these sites. The lack of suitable habitats makes regular use of these areas unlikely.

The other COPC that pose potential acute risks to bird and mammal species in Cropsy Creek include: cadmium, copper, and manganese. Risks from acute exposure in Wightman Fork are substantially lower, although the risks from chronic exposure in those areas with suitable habitat (i.e., natural, undisturbed habitat) may be present.

1.6.3 Human Health Risk Assessment

The potential for exposure is based on the existing Site conditions and potential future Site conditions. Groups assessed for potential exposure pathways include on-site workers, on-site residents, off-site residents, and intruders/trespassers. Presently, access to the Site is being controlled. Currently, on-site workers, trained under OSHA HAZWOPER, are required to use personal protective equipment (PPE), and are routinely monitored; therefore, they are evaluated under a separate process. Since the Site is a historic mining district, on-site residents are not considered a viable exposed population currently or in the future. Off-site residents and potential off-site recreational receptors will require evaluation during a baseline risk assessment.

1.6.3.1 Exposure Scenario

The potential for exposure is based on the existing Site conditions and potential future Site conditions. Groups assessed for potential exposure pathways include on-site workers, on-site residents, off-site residents, and intruders/trespassers. Presently, access to the Site is being controlled. Currently, on-site workers, trained under OSHA HAZWOPER, are required to use personal protective equipment (PPE), and are routinely monitored; therefore, they are evaluated under a separate process. Since the Site is a historic mining district, on-site residents are not considered a viable exposed population currently or in the future. Off-site residents and potential off-site recreational receptors will require evaluation during a baseline risk assessment.

1.6.3.2 Exposure Pathways

An exposure pathway describes the route a chemical may take from the source to the exposed individual. A complete pathway consists of four elements: a source and mechanism of chemical release to the environment, an environmental transport medium, a point of potential human contact with contaminated medium, and an exposure route. The transport medium can be air, ground water, soil, surface water, etc. The route can be inhalation ingestion or dermal contact with the medium.

Evaluation of the potential pathways suggests that most exposure pathways at the Site are incomplete. Currently, the only pathway with sufficient data for assessment is surface water. There is insufficient sampling data available to determine whether soil, ground water, and/or air are exposure pathways.

1.7 Description of Alternatives

This section describes the alternatives retained for detailed analysis for this interim remedial action. A description of all options considered for the HLP IROD can be found in the HLP FFS. The six alternatives retained for detailed analysis to be discussed in this IROD are the following (see Table 9).

1.7.1 Alternative 5-1: No Action

This alternative assumes no additional action or construction activities will be undertaken at the current time. This alternative also assumes the existing volume of leachate currently retained in the saturated zone between the underliner and the 11,550 foot elevation will be left in place with no additional treatment. The HLP would continue to release cyanide and metals to the environment. Periodic monitoring of ground water would be required to assess the quantities of cyanide and/or metal contaminants discharging from the HLP.

1.7.2 Alternative 5-2: Pump and Treat/Recontour & Cap

This alternative involves pumping and treating leachate contained in the saturated zone of the HLP followed by discharge of treated waters to Wightman Fork. The leachate would be treated in the existing CDP and the MRP at a flow rate of 700 gpm. Water treatment would consist of the addition of hydrogen peroxide in the CDP to reduce cyanide concentrations and the use of an insoluble sulfide precipitation process in the MRP. Up to 6 months will be required to complete the draining of the HLP, during which time all flows entering the French Drain would be combined with the leachate and treated in the CDP and MRP plants.

New extraction pumps would be lowered into the existing well cans on the north side of the HLP or new extraction wells with pumps would be drilled and installed adjacent to the well cans. Either approach would ensure the pump intakes are at the lowest levels within the HLP. The existing pipelines to and from the CDP and MRP plants would be maintained.

After the draining and treating of the leachate is underway, the HLP would be graded, recontoured to a 4:1 slope, and capped using a four foot layer of crushed stone covered with six inches of topsoil. Recontouring and capping would minimize infiltration and revegetation to achieve slope stability and adequate diversion of surface water flows around the HLP, and decrease flows from the HLP itself. Existing surface water diversions both up and downstream of the HLP would be re-evaluated following the completion of the EE/CA for the CWP, and reworked, if required. Recontouring and capping is expected to require one construction season to complete.

The primary goal of this alternative is to minimize water infiltration into the HLP with the cap and cover, while preventing subsequent acid generation and metal mobilization. Any residual cyanide contamination adsorbed on the solid surfaces of the ore material would be held in place within the HLP, as long as the HLP is able to maintain its drained state. Following the draining and treating of the leachate, both the CDP and MRP plants would be held in standby operation in the event precipitation occurrences and/or spring run-offs create leachate within the HLP with elevated metals concentrations. The HLP would act as its own surge or storage pond, with HLP solutions being treated when high solution levels and concentrations are encountered. The underliner within the HLP will remain intact, and the existing French Drain beneath the HLP would be maintained to provide direct discharge of all ground water flows.

The standby water treatment, consisting of the potential use of the CDP and MRP plants, would be maintained for an indefinite period, pending long term monitoring assessments to confirm changes in the migration of cyanide and/or metal contaminants. The sludge generated from the water treatment would be placed in the HLP for mixing with the spent ore prior to recontouring. After the leachate in the HLP is pumped and treated, water treatment would convert to biotreatment for one full year.

1.7.3 Alternative 5-3: Injection-Extraction Wells/Pump & Treat/Biotreatment/Recontour & Cap/Bioreactor

This alternative includes an HLP solution collection system consisting of injection/extraction wells installed in the HLP in a grid pattern (i.e. 100-ft. or 200-ft. centers) to collect and divert all HLP infiltration to the existing CDP and MRP plants for treatment. The existing pipelines to and from the CDP and MRP plants would be routed and tied into the injection/extraction wells. To prepare for biotreatment, all leachate would be pumped, treated and discharged off-site.

Water treatment would initially consist of hydrogen peroxide in the CDP and the insoluble sulfide precipitation process in the MR. During this treatment period, all flows entering the French Drain would be combined with the leachate and treated in the CDP and MRP plants. The sludge generated from the water treatment would be placed in the HLP for mixing with the spent ore prior to recontouring. After the leachate in the HLP is pumped and treated, water treatment would convert to biotreatment for one full year.

The objective of the biotreatment process is to destroy the cyanide. Biotreatment micro-organisms and additives would be introduced into biotreatment tanks incorporate into the water circulation circuit, while inorganic chemical additions would cease. Eventually, as the biotreatment process progresses, inoculation of ore solids contained in the HLP would begin. One pore volume of solution would be used to inoculate the ore. Upon completion of the cyanide detoxification efforts, the residual solutions in the HLP would be pumped, treated for metals removal in the MRP, and discharged off-site.

The HLP would be graded, recontoured, capped and revegetated to achieve slope stability and adequate diversion of surge water flows around the HLP, and to decrease flow from the HLP itself. Existing surface water diversions both up and downstream of the HLP would be re-evaluated following the completion of the EE/CA for the CWP, and reworked, if required. This construction activity is expected to require two construction seasons to complete.

The HLP underliner will remain as is and the existing French Drain beneath the HLP would be maintained to provide free drainage of all ground water flows.

Upon completing the draining of the residual biotreatment solutions, it is intended that all flows entering the French Drain will be discharged upstream from the Site. If the flows entering the French Drain are of poor quality (i.e., metals concentrations greater than surface water quality standards), the lined surge pond and corresponding bioreactor using sulfate reducing bacteria would be activated. Significant buildup of contaminated leachate in the HLP would be pumped to the surge pond for controlled rate discharge to the bioreactor. Use of bioreactor would reduce the need for active water treatment by reducing metal mobilization and detoxifying cyanide and thereby reducing operating costs. The bioreactor would use a geomembrane cover to exclude oxygen (as opposed to a natural plant cover used in an artificial wetland). Periodic monitoring of ground water would be required to assess cyanide and/or metal concentrations.

The duration of bioreactor operation is unknown. The longevity of the bioreactor substrate is difficult to predict, but should be a minimum of 3 years. Replacement of the substrate will be required due to reduction of the nutrients needed by the bacteria, buildup of metal sulfide precipitation, and bed plugging.

1.7.4 Alternative 5-4: Extraction Pumps & Underdrippers/Water Rinse/Recontour & Cap

This alternative includes new extraction pumps into the existing well cans on the north side of the HLP, or installation of new extraction wells installed adjacent the well cans. A rain minimum of 4 extraction well pumps are necessary. The existing pipelines to and from the CDP and MR plants would be tied into the extraction pumps (the underdripper system is currently tied in). The leachate in the HLP would not have to be removed initially. Rinsing would be accomplished using the existing underdripper system and new surface dripper systems. About half of the HLP ore volume could be rinsed in this manner. Water treatment would consist of hydrogen peroxide in the CDP and the insoluble sulfide precipitation process in the MRP. Water rinsing of the HLP would continue for about 18 months.

During this water rinse program, all flows entering the French Drain would be combined with the rinse cycles and treated in the CDP and MPR plants. Upon completion of the water rinsing efforts, the residual leachate in the HLP would be pumped, treated and discharged off-site. The sludge generated from the water treatment during the first two years would be placed in the HLP for mixing with the spent ore prior to recontouring. Sludge generated after the first two years would be dewatered and disposed off-site.

The HLP would be graded, recontoured, capped and revegetated to achieve slope stability and adequate routing of surface water flows around the HLP. These measures would minimize the flow from the HLP itself. Existing surface water diversions both up- and down-stream of the HLP, would be re-evaluated following the completion of the EE/CA for the CWP and reworked, if required. This construction activity is expected to require three construction seasons to complete.

Upon completing the rinsing, draining and treating of all leachates, both the CDP and plants would be placed in standby operation. Plant operations would be initiated in the event precipitation occurrences and/or spring run-off require treatment of solutions accumulating within the HLP. The HLP underliner will remain as is, and the existing French Drain beneath the HLP would be maintained to provide free drainage of all ground water flows. Upon completing the draining of residual solutions in the HLP, all flows entering the French Drain will be discharged untreated from the Site. Periodic monitoring of ground water would be required to assess cyanide and/or metal concentrations.

1.7.5 Alternative 5-5: Partial HLP Removal/Injection-Extraction Wells/Water Rinse/Recontour & Cap

This alternative includes removing the upper portion of the HLP down to the first set of intermediate liners at the 11,610 ft. elevation. The excavated material and liners would be hauled and backfilled into the Mine Pits which in turn would be contoured and revegetated. The remainder of the HLP would be opened up by drilling a series of injection/extraction wells in a grid pattern (i.e 100-ft. or 200-ft. centers) to collect and divert all water infiltrations to the existing CDP and MRP treatment facilities. The removal of 3 to 6 liners will improve the ability to flush the remainder of the HLP. In addition, the removed ore could be used as capping material for the mine pits. The existing pipelines to and from the CDP and MRP plants would be routed and tied into the injection/extraction wells.

Water treatment would consist of hydrogen peroxide in the CDP and the insoluble sulfide precipitation process in the MRP. Water rinsing of the HLP would continue for a full two years during which time no effort will be made to collect and treat discharges from the French Drain Sump. The sludge generated from the water treatment during this time would be placed in the HLP for mixing with the spent ore prior to recontouring. Sludge generated after the first two years would be dewatered and disposed off-site.

Upon completion of the cyanide detoxification, the residual leachate in the HLP would be treated and discharged. The lower portion of the HLP would be graded, recontoured, capped and revegetated to achieve slope stability and adequate routing of surface water flows around and from the HLP itself. Existing surface water diversions both up- and down-stream of the HLP would be re-evaluated following the completion of the EE/CA for the CWP and reworked, if required. This construction activity is expected to require 2 and one-half years to complete. The underliner within the HLP will remain intact, and the existing french drain beneath the HLP would be maintained to provide free drainage of all ground water flows.

With the exception of the two-year water rinse period, all flows entering the French Drain will be discharged untreated from the Site. Surface and ground water flows entering from upstream sources would serve as a diluting media for the small amount of discharge still emanating from the HLP. With subsequent drop in hydraulic head following the discharge of all solutions from the HLP, very little driving force would be encountered to force residual contaminants from the HLP. Periodic monitoring of ground water would be required to assess cyanide and/or metal concentrations.

1.7.6 Alternative 5-6: Pump and Treat/Total HLP Removal/Ex situ Ore Treatment/Disposal On-Site

This alternative involves remediation of the HLP by excavating and dismantling the entire HLP. Initially, the leachate contained in the saturated zone of the HLP would be pumped and treated in the existing CDP and MRP water treatment plants. The flow rate would be 700 gpm, requiring up to 6 months to complete the draining of the HLP during which time all flows entering the French Drain would also be combined with the leachate and treated in the CDP and MRP plants.

Upon completing the draining of leachate in the HLP, all flows entering the French Drain will be discharged untreated from the Site. The HLP would be dismantled by conventional earth moving and mine equipment.

The spent ore material would be treated by water rinsing in conventional milling equipment to remove adsorbed cyanide contaminations. The treated solids would be hauled for disposal into the Mine Pits. The backfilled material would be graded, contoured, capped and revegetated to provide positive drainage and minimize air and water infiltration. Water washes during milling would use chemical oxidants and/or biotreatment chemicals to assist in detoxifying cyanide from the ore solids and oxidize the soluble cyanide. The washes would be caught and recycled to minimize water usage. Upon full excavation of the HLP, the HLP footprint would be graded, contoured, amended with neutralizing materials and revegetated to prevent further erosion and acid rock drainage (ARD) generation.

Upon completion of the ore treatment, all water used in the rinsing of the ore would be treated and discharged. During the execution of this alternative, both the CDP and MRP plants would be held in standby operation. Plant operations would be initiated in the event precipitation occurrences and/or spring run-offs require treatment of waters and solutions accumulating in and around the HLP. Until the excavation reached the lower sections of the HLP, the underliner would remain intact, and the existing French Drain beneath the HLP would be maintained to provide free drainage of all ground water flows. This alternative would require two to three construction seasons to complete.

1.8 Comparative Analysis of Alternatives

The evaluation criteria are requirements that must be addressed in this IROD. CERCLA requires that remedial actions must satisfy the following threshold criteria:

- Protect human health and the environment
- Attain ARARs (or provide grounds for invoking an interim action waiver)

After satisfying the threshold criteria, the following balancing criteria are evaluated:

- Long term effectiveness
- Reduction of toxicity, mobility or volume as a principal element
- Short term effectiveness
- Implementability
- Cost effectiveness
- State acceptance
- Community acceptance

Each of the alternatives retained after the initial screening is evaluated in this section against these nine criteria in accordance with the National Oil and Hazardous Substances Contingency Plan (NCP). Table 10 summarizes the comparative analysis of alternatives.

1.8.1 Criteria 1: Overall Protection of Human Health and the Environment

This criterion assesses the protection provided by each alternative to human health and the environment. Overall protection focuses on the level of protection provided by each alternative and how Site risks will be eliminated, reduced, or controlled through treatment, engineering or institutional controls.

Alternative 5-6 would provide the highest protection through removal of the HLP to the mine pits. Alternative 5-1 would provide the least protection. The remaining alternatives would provide protection ranging from moderate to high, depending on type and number of remedial technologies and process options employed. (See Table 10).

The principal environmental impact from the HLP is cyanide and toxic metals being released to Wightman Fork and the Alamosa River. Alternative 5-6 controls those impacts to Wightman Fork and the Alamosa River by effectively reducing the amount of contaminated drainage that is released into these surface water bodies.

Alternatives 5-3, 5-4, 5-5 provide equivalent protectiveness to Alternative 5-6, but may require continued water treatment to maintain Risk-Based Action Levels to achieve final remediation goals.

1.8.2 Criteria 2: Compliance with ARARS

Under Section 121(d)(1) of CERCLA, remedial actions must attain standards, requirements, limitations, or criteria that are applicable or "relevant and appropriate" under the circumstances of the release at the Site. For the Summitville Site, the promulgated Colorado Water Quality Standards are the chemical specific ambient water quality standards applicable to the interim remedial actions. The chemical specific surface water quality ARARs are presented in Table 7.

The National Pollution Discharge Elimination System stormwater permitting requirements are also applicable to actions at the Site, and require implementation of Best Management Practices for control of storm water. The Colorado Mined Land Reclamation rules are also applicable as a final benchmark against which any reclamation at the Site is measured.

Compliance with ARARs addresses whether or not an alternative will attain Federal and State environmental laws and or provide grounds for a waiver. None of the alternatives will serve to attain surface water quality ARARs independently, but in concert with other interim remedial and final remedial actions at the Site, all the alternatives evaluated, with the exception of Alternative 5-1, will attain all ARARs of federal and state statutes and regulations. Alternative 5-1 will not meet remedial action objectives and will not contribute to attainment of surface water quality ARARs in the Alamosa River.

With the exception of no action, all of the alternatives employ best management practices (BMP) for controlling storm water and thus attain the NPDES stormwater permitting requirements. Likewise, with the exception of no action, all of the alternatives attain the narrative Mined Land Reclamation requirements.

1.8.3 Criteria 3: Long-Term Effectiveness and Permanence

This criterion measures the ability of a remedy to provide reliable protection of human health and the environment over time. The destruction and/or removal of the cyanide was the determining factor for the type of remedy or alternative that was selected. Based on this criteria, Alternative 5-6 would provide the highest degree of long-term effectiveness and permanence, with complete excavation and dismantling of the HLP, followed with treating all excavated spent ore materials with water rinsing before backfilling the treated ore into the mine pits. Alternative 5-5 combines partial spent ore removal with water rinsing of the lower sections of the HLP, and would be rated high in terms of long-term effectiveness and permanence. Alternative 5-3 also provides a high degree of long-term effectiveness in controlling cyanide and metal discharges from the HLP by pumping and treating the HLP leachate, biodetoxifying in place the spent ore of cyanide, capping the HLP, with continued metals removal through conventional methods and finally a bioreactor. The bioreactor could also serve to compliment the final site closure plan. Alternative 5-1, No Action, would not provide long-term effectiveness nor permanence. The remaining alternatives would range from moderate to high in long-term effectiveness and permanence, depending on type and number of remedial technologies and process options employed (see Table 10).

1.8.4 Criteria 4: Reduction of Toxicity, Mobility or Volume

This criterion refers to whether a remedy reduces health hazards, reduces the movement of contaminants, or reduces the quantity of contaminants at the Site. Alternative 5-1, No Action, will not attain reduction of toxicity, mobility or volume. All remaining alternatives will reduce toxicity, mobility and volume of contaminants, with Alternative 5-6, eliminating the entire volume of the HLP and its source of cyanide, being the most effective. Alternative 5-3 reduces the toxicity of the cyanide through treatment and will impact the mobility of metals contamination by reducing infiltration and the generation of leachate.

1.8.5 Criteria 5: Short-Term Effectiveness

This criterion refers to the period of time needed to complete the remedy and any adverse effect to human health and the environment that may be caused by construction and implementation of the remedy. All alternatives would expose workers to contaminants during sampling and construction activities. Alternative 5-1 would not provide any reduction of cyanide or metals. All remaining alternatives would show rapid reductions of contaminant levels following initiation.

1.8.6 Criteria 6: Implementability

This criterion refers to the technical and administrative feasibility of a remedy. All alternatives are implementable. Alternative 5-1, No Action, the easiest to implement, since it required no change to existing site conditions. Alternative 5-6 is the most difficult to implement, due to the equipment and manpower resources that must be brought to this remote location. The remaining alternatives range from easy to moderate to implement.

1.8.7 Criteria 7: Cost

This criterion evaluates the estimated capital, operation and maintenance costs of each alternative in comparison to other equally protective alternatives. Costs are presented in Table 10. The cost for Alternative 5-1, No Action, is the lowest and Alternative 5-6 has costs significantly higher than the other alternatives. The present value cost for Alternative 5-1 is $261,000. The cost of Alternative 522 is $13,772,000. Costs for Alternatives 5-3 and 5-4 are $18,929,000 and $21,411,000, respectively. The cost for Alternative 5-5 is $22,923,000 and the cost for Alternative 5-6 is $74,176,000.

1.8.8 Criteria 8: State Acceptance

State acceptance describes whether the State agrees with, opposes, or has no comment on the preferred alternative. The State concurs in the selection of Alternative 5-3 as the interim remedial action of the HLP.

1.8.9 Criteria 9: Community Acceptance

Community acceptance includes determining which components of the alternatives interests persons in the community support, have reservations about, or oppose. Several commenters were concerned with the installation and operation of the injection well system. Other commenters were unsure that the selection of Alternative 5-3 was the best possible selection and that the selection process was inadequately documented. Some commenters questioned the current condition of the HLP underliner and intermediate liners. The community response to the alternatives is presented in the responsiveness summary, attached to this document, which addresses comments received during the public comment period.

1.9 Selected Alternative

The selected interim remedy for cleanup of the HLP serves to prevent or reduce migration of cyanide and/or metal contaminants. The selected interim remedy, Alternative 5-3: Injection-Extraction Wells, Pump and Treat, Biotreatment, Recontour, Capping and Bioreactor is best suited to allow progress toward achieving remedial action objectives and goals. This alternative revolves the installation of 21 extraction wells, pumping and treating of the contaminated water (leachate) currently contained within the HLP, followed with biotreatment to inoculate the HLP with cyanide-destroying bacteria. Upon completion of the biotreatment process during which all solutions are treated and discharged, the HLP would be graded, recontoured using a 4:1 slope, capped using a four foot layer of crushed stone covered with six inches of topsoil, and revegetated with native grasses. A four-cell bioreactor and a surge pond would be located downstream to serve as added protection to treat any possible acid waters generated once the HLP is remediated. The surge pond will be designed to contain the maximum anticipated/modeled flows which exceed treatment plant capacity. The bioreactor/surge pond could be incorporated with all Site remedies. Analytical and laboratory tests are still underway to refine biotreatment design parameters.

Alternative 5-3 was the selected remedy for the HLP due to the following criteria:

- This alternative provides an overall protection to human health and the environment.
- The selected alternative alone will not attain all ARARs, but will attain ARARs in concert with the other interim and final remedial actions.
- This alternative provides long term effectiveness in controlling cyanide and metal discharges from the HLP by pumping and treating the HLP leachate, biodetoxifying the ore of cyanide, capping the HLP, and continuing metals removal through conventional methods and through a bioreactor.
- The alternative reduces the toxicity of the cyanide through treatment and will impact the mobility of metals contamination by reducing infiltration and the generation of leachate.
- The alternative provides short term effectiveness by continuing water treatment until the benefits of the other remedial activities are realized.

- This alternative can be implemented with available resources and may be completed within two years.

- The cost of this alternative is estimated at $18,929,000 for a five-year period and is reasonably related to the anticipated environmental benefits.

1.10 Statutory Determinations

The selected remedy satisfies the requirements of Section 121 of Superfund Amendments and Reauthorization Act of 1986 (SARA). SARA requires that Superfund remedial actions be protective of human health and the environment. SARA also mandates that the selected remedy attain applicable or relevant and appropriate environmental standards established under Federal and State environmental laws except in those circumstances where a waiver is justified. In addition, the selected remedy must be cost-effective and utilize permanent solutions and treatment technologies to the maximum extent practicable. SARA also expresses a strong preference for remedies that as their principal element employ treatment technologies that permanently and significantly reduce the volume, toxicity, or mobility of the hazardous substances. The following sections describe how the selected remedy addresses these statutory provisions.

1.10.1 Protection of Human Health and the Environment

The selected remedy provides interim protection to human health and the environment by pumping and treating the HLP leachate, in situ detoxification of the ore, capping of the HLP, and continual water treatment by conventional methods initially and via bioreactor until the interim remedial objectives and goals can be met without treatment, and until final remediation is accomplished. The remedy will rapidly reduce cyanide concentrations and contribute towards reducing the release of metals.

1.10.2 Compliance with Applicable or Relevant and Appropriate Requirements

Under Section 121(d)(1) of CERCLA, remedial actions must attain standards, requirements, limitations, or criteria that are applicable or "relevant and appropriate" under the circumstances of the release at the Site. Alone, this interim action will not attain the surface water quality Applicable or Relevant and Appropriate Requirements (ARARs) for metals in Segment 3b of the Alamosa River. This interim action, in concert with the other interim actions at the site will attain the surface water quality ARARs for cyanide in Segment 3b. The selected remedy will meet all applicable or relevant and appropriate requirements of federal and sate law for the HLP interim response actions. No ARARs are being waived.

1.10.3 Cost Effectiveness

The selected remedy is cost-effective because it has been determined to provide overall effectiveness proportional to its costs, the net present worth value being $18,929,000. The selected remedy will provide long-term effectiveness and permanence; however, the duration of bioreactor operation is unknown. The longevity of the bioreactor substrate is difficult to predict, but should be a minimum of 3 years. Replacement of the substrate will be required in the long term due to reduction to nutrients required for the bacteria, buildup of metal sulfide precipitation, and bed plugging. The effectiveness of the bioreactor and the substrate longevity will be determined in laboratory and field pilot studies. Capping will reduce the volume of water requiring treatment.

1.10.4 Utilization of Permanent Solutions and Alternative Treatment Technologies to Maximum Extent Practicable and Preference for Treatment as a Principal Element

In selecting the remedy for the Summitville Minesite HLP, EPA has utilized permanent solutions and alternative treatment technologies to the maximum extent practicable. EPA identified and screened alternatives, which as a preference, include biotreatment as a principal element. Biotreatment is accomplished through detoxifying cyanide through the CDP and metals attenuation through the MRP. These biotreatment processes represent innovative technology types currently being tested.

2.0 RESPONSIVENESS SUMMARY

2.1 Responsiveness Summary Overview

The EPA held a public comment period from August 23, 1994 to October 23, 1994 for interested parties to comment on the HLP FFS for the Summitville Minesite and the Proposed Plans for the Summitville Mine.

EPA held public meetings on September 8 and October 12, 1994 in Alamosa, Colorado to present the results of the FFS and the preferred alternative as presented in the document. All comments received by the EPA prior to the end of the public comment period have been responded to and the Responsiveness Summaries are attached to this document. Transcripts are available in the administrative record for the comments received during the September 8 and October 12, 1994 public meetings.

2.2 Summary and Response to Heap Leach Pad Specific Comments

Comment 1:
A comment was received regarding EPA's rejection of the use of alkaline amendments (based on technical implementability) as shown in the table in Section 3.5 of the FFS.

Response:
The comment provided in the table relates to treatability tests on Summitville mining waste which demonstrated alkaline additions would be quickly consumed should acid solutions come in contact with the amended material. These tests also demonstrated very large additions of alkaline amendments would be required for the Summitville waste materials. However, given the size and quantity of the HLP itself, any attempts to blend alkaline material throughout the HLP would make this alternative (either by itself or in combination with other technologies) very costly and difficult to implement. Alkaline amendments will most likely be blended into the capping material to aid revegetating the HLP cover.

Comment 2:
One commenter did not think the selection of Alternative 5-3: Injection-Extraction Wells/Pump & Treat/Biotreatment/Recontour & Cap/Bioreactor was adequately supported by the documentation provided.

Response:
The selection of Alternative 5-3: Injection-Extraction Wells/Pump & Treat/Biotreatment/Recontour & Cap/Bioreactor is based on actual remedial efforts at three other Minesites where cyanide heap leach practices were conducted: Cyprus's Copperstone Mine in Arizona, Hecla's Yellow Pine Mine in Idaho, and Inland Gold and Silver's Toiyabe Mine in central Nevada. At the Copperstone Mine, a 1.2 million ton leach pad was treated biologically, reducing weak acid disociable (WAD) and total cyanide levels in the heap leachate solutions from 30 to 0.2 mg/L. The Yellow Pine Mine used biotreatment methods on a 1.3 million ton leach pad, reducing WAD cyanide from 47 to 0.2 mg/L in heap leach solutions. This Site also demonstrated biotreatment methods in cold weather climates, similar to what will be anticipated at Summitville where low solution temperatures and extreme cold conditions will be encountered during operations. The Toiyabe Mine successfully treated 2.6 million tons of spent ore in two leach pads biologically, reducing WAD cyanide from 12 to 0.2 mg/L. All three mines accomplished these cyanide detoxifications with application rates of less than 0.5 tons of solution per ton of ore treated. These facts, in conjunction with treatability tests completed on Summitville HLP spent ore materials, were the basis for selecting Alternative 5-3. Although it is stated Alternative 5-2 will achieve ARARs, this may only be short term successes. Long term leakage of cyanided metal complexes may result from the inability of the water flush to reduce adsorbed cyanide present in the HLP. Results from the treatability test control column demonstrate water flushing was not effective in cyanide detoxification.

Comment 3:
A commenter thought the injection well grid, shown on Figure 5-5 in the Heap Leach Pad FFS, should have the same number of wells displayed as the number of wells proposed for installation.

Response:
Figure 5-5 shows a typical well grid spacing for the HLP and is for presentation purposes only. The costs presented in Table 5-3 (21 wells) of the IFS are based on the number of wells estimated to be required given the areal extent of the HLP and areas of influence of each well. Cost estimates listed in Table 5-3 of the FFS are an order of magnitude cost estimate (-30%, +50%) as directed in EPA Office of Soil Waste and Emergency Response (OSWER) Directive 9355.3-01, Guidance for Conducting Remedial Investigation and Feasibility Studies Under CERCLA (Interim Final, October 1988). They will be updated once remedial design information has been obtained.

Comment 4:
A comment was received indicating that the description of Alternative 5-3 should have addressed the problems associated with the intermediate liners and how the proposed injection/extraction wells will enhance the current rinse program.

Response:
The operating condition of the existing solution application system (the underdripper system) is very much in question, particularly in the lower sections of the HLP where the overall weight of the deposited ore materials may have crushed the system so that its solution distribution capabilities are impaired. Higher levels of cyanide may still exist in these lower sections of the HLP. The injection-extraction wells were selected on the basis they could be installed in a grid pattern which would be more effective in reaching the isolated regions of the HLP. With the injection-extraction wells, packers can be inserted into individual wells above and below certain HLP horizons to direct solutions in a horizontal flow pattern away from each well, facilitating the cyanide removal capability of the biotreatment process.

Comment 5:
One commenter indicated that the HLP Investigation Report did not use chemical specific ARARs for surface water in Section 6.2.4 of the FFS.

Response:
The State of Colorado has promulgated a standard which states downstream use has to be protected, and this Site has to comply with this standard. Also, the calculations cited from Section 6.2.4 of the FFS and included in Tables 6-9 and 6-10 of the HLP Investigation Report list the chemical specific ARAR for cyanide, which for Stream Segment 3b is 0.005 mg/L. In both tables, the chemical specific ARAR for cyanide is the basis for the more stringent target.

Comment 6:
A commenter felt that the FFS did not present sufficient design parameters to justify the use of biotreatment technology.

Response:
The guidelines for completing feasibility studies, as detailed in OSWER Directive 9355.3-01, Guidance for Conducting Remedial Investigation and Feasibility Studies (Interim Final, October 1988), suggest reaching the alternative selection process as quickly as possible in order to complete the comparative analysis for selected remedies. The design information requested by the commenter is beyond the feasibility study process, and will be supplied at a future date in site-specific design documents. Treatability tests have justified the selection of the biotreatment process.

Comment 7:
A comment was received indicating that the FFS should have stated why the bioreactor, used in providing long term metals attenuation, is necessary.

Response:
There are concerns with the ground water re-establishing itself within the HLP over a period of time. Short term prospects indicate acid rock drainage (ARD) may not be a problem; however, with elapsed time, there may be a concern. The bioreactor would serve as added insurance to trim all discharges emanating from the HLP (it is possible the bioreactor design will incorporate all drainages from the Site). It is suggested the reader refer to the Crospy Waste Pile Amendment Testing Final Report prepared by Environmental Chemical Corporation, July 1994 which is part of the administrative record.

Comment 8:
One commenter indicated that the analytical methods for quality control should have been provided in the FFS.

Response:
A listing of analytical methods of quality control measures will be provided in the overall Site Remedial Investigation/Feasibility Study (RI/FS) to be issued at a later date. It is beyond the scope of this document to supply this information. However, the methods can be found in the administrative record in the numerous Sampling and Analysis Plans (SAPs), as well as the overall Quality Assurance Project Plan (QAPP) prepared for the Site.

Comment 9:
A commenter indicated that if the final remedy for the HLP had been selected it should be presented in the FFS.

Response:
Interim actions start the overall process of site remedy. The major remedial action objectives for these interim actions have been identified as reduction in acid mine drainage, cyanide detoxification and waste pile minimization and containment. These objectives will not change for the overall site remedy so that there will not be any conflict of issues between interim actions and final site remedy. The short term goals will also serve to protect the environment.

Comment 10:
One commenter stated that the EPA should know if complexes of cyanide and sulfur and thiocyanate are present and if they pass through the current water treatment system.

Response:
Other complexes of cyanide are known to exist. From an historical perspective, when Summitville Consolidated Mining Company, Inc. (SCMCI) operated the mine, thiocyanate levels reached 167 ppm (at the barren solution pond, December 1987). The most recent information on file, October 1992, indicate thiocyanate levels are now 0.1-0.3 ppm. Thiocyanate passes through the current water treatment system. To date, it has not been established thiocyanate is a contaminant of potential concern, requiring monitoring. This will be established at a later date after toxicity levels have been thoroughly identified.

Comment 11:
A commenter indicated that the cyanide content in the drainage stream downgradient of the HLP should have been provided in the FFS. This commenter further states that if the water being returned to the HLP has a pH of 2.5 to 3.5 then the HLP has the potential to generate HCN gas.

Response:
The cyanide concentration detected in downstream drainages is variable, depending on date in which monitoring was completed. Any cyanide-contaminated solutions reaching a pH of 2.5 would have previously off-gased as HCN. All solutions in the French drain sump are now being caught and neutralized before being returned to the HLP.

Comment 12:
One commenter questioned whether the clay liner beneath the HLP is intact and where the cyanide leachate is flowing into the French drain. This commenter indicated that stopping the cyanide source would stop the cyanide problem.

Response:
The clay liner is not intact. The quantity of ore material placed on top of the liner precludes identifying the location of the breach and/or repairing any tears short of dismantling and hauling off significant quantities of HLP material.

Comment 13:
Another commenter questioned whether the polyethylene liner was breached or if poor application practices resulted in the cyanide leakage.

Response:
All information on file support the conclusion the liner was torn, with solution leaking into the French drain system underneath the HLP. Leakage was not due to poor application practices. The overall integrity of the intermediate liners is not known. Some may be in good shape, while others appear not to be intact. The reader is referred to the Heap Leach System Report, prepared by SCMCI, May 27, 1992 which is part of the administrative record.

Comment 14:
A commenter questioned whether any chemicals other than hydrogen peroxide or processes such as SO2 or Caro's acid treatment were evaluated.

Response:
Chemicals other than hydrogen peroxide were evaluated through a Request For Proposal (RFP) effort on water treatment processes initiated in November 1993 and preceding the FFS. Evaluations of the various proposals demonstrated change outs from the existing system would be costly and time consuming to complete. The RFP package is part of the administrative record on file with EPA, Region VIII. Additional studies in the ongoing RI/FS were also completed, and include evaluations of the sulfur dioxide process, but not Caro's acid treatment.

Comment 15:
One commenter questioned whether investigations were performed to evaluate the potential of adding a bactericide to the HLP to prevent ARD generation. The commenter recommended current practices used by MV

Technologies.

Response:
The MV Technologies Process was evaluated for possible use in other areas of the Site. It was not evaluated in the HLP remedy selection because it's an acid abatement process incorporating a bactericide for retarding acid generation. Although the HLP materials contain some sulfide mineralization, the immediate problem with the HLP is cyanide detoxification. Since bioremediation, using bacteria, is the selected remedy to complete the cyanide detoxification, the EPA believes the addition of a bactericide may pose adverse impacts on the selected remedy. Subsequent acid generation after bioremediating the HLP will be controlled by limiting amount of oxygen that will infiltrate by capping and covering the HLP.

Comment 16:
A comment was received regarding the capital costs of cap material for Alternatives 5-2 and 5-3. The commenter questioned whether the costs shown included reclamation and monitoring of the location where the material was mined.

Response:
The capital costs of $7,000,000, as shown in Tables 5-2 and 5-3 of the FFS, are for quarrying, crushing and transporting the material to the HLP. Monitoring costs would be included in the quarrying costs. No reclamation costs are included, but they would be low since the amount of areas disturbed would be minimal, only sufficing the amount of extra capping materials required. The study only focused on on-site materials, no other sources of capping material have been considered.

Comment 17:
One commenter indicated that the aerobic and anaerobic of the HLP may not be conducive to bacterial activity.

Response:
The biotreatment process to be used at the Site will incorporate a mixture of aerobic and anaerobic bacteria strands which have been cultivated from micro-organisms retrieved from the Site. Both types of bacteria will be commingled in solutions introduced into the HLP The aerobic strands will be effective in detoxifying those zones where oxygenated conditions exist (upper levels); while the anaerobic strands migrate to the lower reaches where non-oxygenated conditions exist. Treatability tests have been conducted on saturared and non-satrated zones of HLP material, and test results have confirmed cyanide detoxification with both types of bacteria.

Comment 18:
A commenter indicated that during spring runoff, the water level in the HLP Dike 1 might exceed the capacity of the water treatment plant and result in overtopping of the dike. The commenter felt that provisions should be made for adequate pumping and water treatment capacity to prevent overtopping.

Response:
Alternative 5-3 is initiated with the installation of the injection-extraction wells, followed by a pump and treat step. During the pump and treat, cyanide-ladened solutions currently held within the HLP will be withdrawn and treated with bacteria as the solution flows through tanks added to the water treatment plants. During the pump and treat activity, solutions with bacteria will be recycled back to the HLP to start the inoculation of the HLP. The recycled flows will be at reduced flows so that the net effect is to reduce the solution levels within the HLP. The main reason for testing saturated conditions in the treatability work is to confirm bacterial activity can be initiated while the pump and treat step is underway. Alternative 5-3 is very concerned with reducing current solution levels within the HLP for the primary reason spring runoffs have to be anticipated and managed.

Comment 19:
Two commenters questioned whether cyanide "hotspots" would remain beneath the intermediate liners or in pockets and if these areas would be reached by a bacteria containing rinse.

Response:
The injection-extraction well system was selected because a more positive control of solution flows through the HLP can be maintained with such a system. Packers can be inserted into wells to direct solutions to various "hotspot" areas (refer to the Response given on Comment 4). The bacteria, once it has been introduced to the HLP, will have a certain amount of diffusion capability, seeking its food source which in this case is the cyanide itself. If after attempts to reach the isolated areas, "hotspots" still remain, any subsequent precipitation event will most likely not result in subsequent solubilizing the isolated cyanide from the HLP.

Comment 20:
A commenter suggested that the proposed injection wells may become plugged due to biological activity.

Response:
Designs can be incorporated into the injection-extraction well system for flushing capabilities.

Comment 21:
One commenter indicated that the French drain would continue to be a source of metals and acid after HLP remediation because it is connected to the Cropsy Waste Pile.

Response:
The Cropsy Waste Pile (CWP) Removal Action should prevent the CWP from being a major source of acid mine drainage (AMD) because waters that have flowed into the CWP will, to a large extent, be intercepted upstream and diverted away from the HLP. Any residual AMD emanating from the CWP remnant should be manageable and can be diluted with other water discharges.

Comment 22:
A commenter suggested that continuous rinsing of the HLP would cause caving and therefore the number of injection wells and their placement would be impossible to determine.

Response:
During the design phase, best professional judgement of the design engineers will be used to determine the appropriate location and design of the wells. During operation, monitoring will determine the overall success.

Comment 23:
A commenter noted that the TAG proposal for water treatment will make the bioreactor unnecessary.

Response:
EPA recognizes the TAG's proposal, treatment of water at the bottom of the Site, will make the bioreactor unnecessary. The TAG proposal, however, does not prevent the further generation of AMD or the control of it at its source. EPA believes the decreasing of AMD generation provides a more permanent solution to the risks to human health and the environment at the Site.

Comment 24:
The TAG proposed that Alternative 2 be reassessed and modified:

- Reduced Heap Leach Pad elevation will avoid redox shifts from aerobic to anaerobic conditions and will make treatment more effective.

- The water levels in the Heap Leach Pad will be raised and the remainder of the pad inundated to infiltrate all cyanide sources.

- Removing Heap Leach Pad material below dike level will allow complete inundation of all remaining "hot spots". This material can be moved into the mine pits.

- EPA should use existing application systems and devices, or use exfiltration beds similar to "leach fields" of septic systems to introduce rinse fluids to the Heap Leach Pad.

- The TAG proposed that the effluent from the French Drain be treated until it meets accepted levels or standards. As this is likely to extend past the period contemplated under Alternative 3, the relative value of TAG's water treatment proposal (see following section for its description) is enhanced.

- Finally, the Heap Leach Pad remediation plan needs to be integrated into the overall site reclamation plan, particularly the storm water management plan, grading plan, and revegetation plan. As has been pointed out, it also needs integration into the water treatment plan.

Response:
Flooding the HLP with water was one of the earlier alternatives (refer to Section 3.0) considered and rejected because of high costs and implementability factors. Potential stability problems with Dike No. 1 would have to be fully resolved. Costs and time to conduct the necessary geotechnical surveys would be excessive and lengthy. To retain the proposed volume of solution to be held within the HLP, the existing dikes may require keying into bedrock to prevent any leakages and to resolve any structural weaknesses. Due to the high fracture zone in the surrounding topography, keying may require extensive grouting, adding to the high capital costs.

Removing the top section(s) of the HLP to the mine pits will return additional material, in excess with what has been placed in the pits to date. This would raise substantially the elevation of the backfilled material in pits, requiring a major regrading plan to accommodate this material. Although this would not constitute a major reason for rejecting the partial removal of HLP material, it does add substantially to haulage and disposal costs of HLP materials. It should be noted Alternative 5-5 deals with a partial removal of the HLP, and it was rejected due to high costs with no substantial gain in overall protection of human health and the environment.

The overall remediation plan for the Site will take into consideration the interim action plans, integrating them in with the storm water management, regrading, revegetation, water treatment and other plans.

2.3 Summary and Response to General Comments

Introduction On August 16, 1994, the United States Environmental Protection Agency, Region VIII (EPA), issued four Focused Feasibility Studies (FFS) relating to proposed remedial action work at the Summitville Mining Site. These four FFSs relate to: (1) Cropsy Waste Pile, Cleveland Cliffs Tailing Ponds, Beaver Mud Dump and Mine Pits; (2) Heap Leach Pad; (3) Water Treatment; and, (4) Site Reclamation. EPA requested public comment on the four FFSs and extended the deadline for comment to October 24, 1994.

Comment 1:
A number of commenters complained that some of the alternatives evaluated by EPA in these FFSs are already being implemented without EPA having followed the remedy selection and public participation procedures of the NCP.

In particular, various commenters objected to the continued placement of the Cropsy Waste Pile into the Mine Pits pursuant to an emergency-like schedule, despite public comment on EPA's previously issued Engineering Evaluation/Cost Analysis (EE/CA). This prior public comment stated such action was inappropriate because EPA did not consider the feasibility of capping the Cropsy Waste pile in its original location and EPA failed to consider potential short and long term impacts on acid mine drainage. Commenters believe removal of the Cropsy Waste Pile and its placement in the Mine Pits will exacerbate site conditions.

In spite of these public comments, EPA awarded a contract in July 1994 to complete the excavation and relocation of the Cropsy Waste Pile (CWP), Beaver Mud Dump (BMD) and Summitville Dam Impoundment (SDI) into the Mine Pits according to the EE/CA and Action Memorandum. Commenters now object to EPA selecting the placement of the Cropsy Waste Pile, BMD and SDI into the Mine Pits as a remedial action alternative. Commenters have suggested that by selecting the EE/CA response action as the interim remedial action, EPA has "pre-selected" the remedial action for the Cropsy Waste Pile and has circumvented the public participation procedures mandated by the Comprehensive Environmental Response, Compensation and Liability Act of 1980, as amended (CERCLA) and the National Contingency Plan (NCP).

Commenters note that both CERCLA and the NCP establish specific steps and procedures that EPA must follow in selection a remedy for all or a portion of a CERCLA Site. See, generally, 42 U.S.C. 9604, 9621; 40 C.F.R. 300.430 and claim that EPA has not followed the NCP procedures. The commenter states that EPA justifies the implementation of the allegedly "pre-selected" remedy by arguing that the public participation undertaken during the EE/CA process last summer satisfies the public's right to participate in the remedial selection process for the Target Areas.

Response:
Excavation and consolidation activities associated with Cropsy Waste Pile, Beaver Mud Dump, Summitville Dam Impoundment (formerly called the Cleveland Cliffs Tailings Pond), and Mine Pit were initiated under an EPA non-time critical removal action pursuant to Section 300.415 of the National Contingency Plan. Such removal activities are appropriate when, among other things, "excavation, consolidation, or removal of highly contaminated soils from drainage or other areas... will reduce the spread of, or direct contact with, the contamination." See, Section 300.415(d)(6) of the NCP at 55 Fed Reg. 8843 (March 8, 1990). Once EPA determines such removal actions are appropriate, response actions shall begin as soon as possible to abate, prevent, minimize, or eliminate the threat posed by the contamination to public health, welfare of the environment. See, Section 300.415(b)(3) of the NCP at 55 Fed Reg. 8843 (March 8, 1990).

According to the NCP, if a six-month planning period exists before EPA initiates a removal action, EPA must conduct an Engineering Evaluation/Cost Analysis (EE/CA). This analysis, although not as extensive as a Remedial Investigation/Feasibility Study, identifies the objectives of the removal action and analyzes the various alternatives that may be used to meet these objectives, based on the alternative's cost, implementability and effectiveness. The EE/CA is then released for public comment, according to the public participation procedures established in Section 300.415(m)(4). Finally, after a minimum 30-day public comment period, EPA issues an Action Memorandum which documents EPA's selection of an appropriate non-time critical removal response action. See also, "Guidance on Conducting Non-Time Critical Removal Actions Under CERCLA," EPA/540-R-93-057, Publication 9360.0-32 (August 1993).

EPA meticulously followed the NCP-prescribed procedure in proposing and selecting the EE/CA-based non-time critical removal for the Cropsy Waste Pile, Beaver Mud Dump, Summitville Dam Impoundment (formerly called the Cleveland Cliffs Tailings Pond), and Mine Pit (collectively, the Target Area). EPA published its EE/CA in July of 1993, solicited and accepted public comments on the EE/CA until early September of 1993, responded to those comments in its "Responsiveness Summary to the Engineering Evaluation/Cost Analysis for the Cropsy Waste Pile, Beaver Mud Dump, the Cleveland Cliffs Tailings Pond (now called the Summitville Dam Impoundment), and Mine Pits, Summitville Minesite, Rio Grande County, Colorado," and issued its Action Memorandum on September 24, 1993. EPA let a contract to begin implementation of this part of the EE/CA-based removal action in July 1994.

EPA is not arguing that providing the public the opportunity to comment on the EE/CA is sufficient to substitute for soliciting public comment on the Target Area FFS and Proposed Plan. EPA agrees that the NCP does not allow EPA to satisfy its public participation obligations for a proposed plan by reference to another document. EPA also agrees that the analysis EPA conducts to evaluate removal alternatives differs greatly from the analysis conducted to evaluate remedial alternatives. For non-time critical removals, EPA evaluates the alternatives in terms of effectiveness, implementability and cost alone. The evaluation of remedial alternative is conducted using the nine criteria of Section 300.430 of the NCP. The two sets of evaluation criteria are not synonymous.

EPA, however, did fully comply with the NCP-prescribed procedures for screening, proposing and selecting remedial alternatives for the Target Areas in its Focused Feasibility Study, Proposed Plan and Interim Record of Decision (ROD). The removal alternative previously selected in the Action Memorandum was one of the alternatives evaluated during EPA's remedy selection process. EPA took public comment on the relative merits of all alternatives evaluated in the FFS vis-a-vis the nine NCP criteria and proposed its preferred alternative in a Proposed Plan, issued in accordance with Section 117 of CERCLA. The alternative previously selected in the Action Memorandum, as expanded in the FFS and Proposed Plan, met the threshold remedy selection criteria of the NCP and provided the best balance of the NCP's "balancing" and "modifying" criteria. It was selected as the appropriate remedial action in the Interim ROD for the CWP. In accordance of the remedy selection criteria of Section 300.430(e) and (f) of the NCP.

EPA therefore selected both the EE/CA-based removal action and interim remedial action according to the different, applicable standards and procedures of the NCP. The fact that the two response actions are similar does not make the implementation of the previously selected removal action illegal or invalid. Moreover, with the letting of the July 1994 contract, EPA was merely initiating the implementation of its validly selected removal action. EPA's publication of the Target Areas FFS and Proposed Plan has no bearing on and should not interfere with EPA going forward with this removal action.

Comment 2:
One commenter strongly recommends that EPA delay removal of the Cropsy Waste Pile until all the potential ramifications have been properly evaluated by the public and by competent technical consultants. Such an evaluation should be conducted after EPA's "Use Attainability Study," which will characterize and evaluate downstream effects from the Site, is completed. The commenter believes there is no reason to implement this remedy on an expedited schedule.

Response:
The Use Attainability Study is being completed by the State of Colorado, Division of Minerals and Geology. The findings of this study will be incorporated into EPA's final response action for the Site. In the meantime, EPA believes the environmental benefits that will be gained from the implementation of interim remedial actions at the Site far outweigh the continued releases of mine waste for the Cropsy Pile.

Comment 3:
Commenters requested an explanation of EPA's rationale for issuing interim rather than final RODs. These commenters feel EPA has no legal or technical basis for issuing IRODs and that there will be additional costs associated with first implementing an interim remedy prior to making a final remedy selection. They also expressed the belief that some of the interim remedial actions may actually exacerbate site conditions and contamination or may prove ultimately incompatible with final remedial action(s) for the Site.

Response:
According to EPA guidance, interim remedial actions are appropriate to "take quick action to protect human health and the environment from an imminent threat in the short term, while a final remedial solution is being developed." See, "Guide to Developing Superfund No Action, Interim Action and Contingency Remedy RODs," US EPA, OSWER Publication 9355.3-02FS-3 (April 1991), at p. 5.

Deterioration of site conditions will lead to continued and heightened exposure of sensitive human and ecological populations to heavy metals and chemicals (e.g. cyanide) used by Galactic and others in their mining operations. The IRODs institute temporary measures to stabilize the Site and prevent further migration of contaminants of concern from the Site into surrounding soil, air and water media. Further, the types of interim actions selected in the IRODs, such as the relocation of contamination from one portion of the Site (CWP) to another (Mine Pits) and the installation of caps to prevent further migration of contaminants are exactly the types of response EPA guidance states are appropriate to implement as interim remedial actions. See, "Interim Final Guidance on Preparing Superfund Decision Documents," OSWER Directive 9355.3-02 (June 1989), at Chapter 9.

Given the existing Site conditions, EPA is certain that filling the Mine Pits will significantly reduce the flow into the Pits and prevent discharges of acid from the Mine Pits into underground workings and ground water. Relocating other mine waste features such as the Cropsy Waste Pile, Beaver Mud Dump and Summitville Dam Impoundment to the Mine Pit will also mitigate these areas as sources of acid mine drainage. Capping the Mine Pits will serve to eliminate or significantly reduce the movement of contaminants of concern through water and air pathways. Treatment of surface water and detoxifying the Heap Leach Pad will eliminate releases of metals and cyanide. Overall, the implementation of interim response actions will quickly reduce the imminent threats to human and environment receptors at and around the Summitville Minesite. EPA will also continue to monitor the progress of these remedies in eliminating or reducing the release of hazardous substances from the Site and will determine what, if any, final remedial actions are necessary to address the remaining risks at the Site.

Comment 4:
Many commenters sought clarification which applicable or relevant and appropriate requirements (ARARs) of federal and state statutes and regulations must be complied with for remedial actions at the Site. Commenters wanted an identification of which ARARs will be met with by the interim actions and which ARARs will be waived. One commenter cautions against the use of "Technical Practicability Waivers" as shortcuts in the remediation.

Response:
The ARARs clarification is provided in the specific Responsiveness Summary on ARARs. Each IROD also identifies the relevant portions of federal and state requirements are being complied with or waived in the implementation of the interim remedial actions. Commenter should be assured that all ARARs waived with the selection of interim remedial action will be re-evaluated for the final remedial action(s) for the Site.

Comment 5:
One commenter noted that each of the FFSs states an "observational site approach" will be taken as part of EPA's interim remedial actions. This commenter believes that an observational approach may be an effective approach to site remediation, provided that all the possible outcomes of the proposed action are identified, evaluated and monitored. The commenter suggested that for potential outcomes that may have adverse consequences, the impacts associated with those outcomes and the probability of their occurrence must be qualitatively defined. If adverse consequences are likely, or that site conditions could be make more complicated and problematic, then implementation of the proposed remedy must be reconsidered. Finally, the commenter declared implementation of a remedial action without an overall plan for each dealing with range of the potential outcomes is inconsistent with a responsible observational approach at a complex site like the Summitville Minesite.

Response:
As discussed in the "Analysis of Alternatives" section in each of the IRODs, EPA has considered all the relative merits and detriments of the potential remedial actions evaluated. "Potential adverse consequences" of implementing the alternatives was evaluated, as was EPA's ability to deal with these potential adverse impacts when EPA reviewed the overall protection to human health and the environment, long-term effectiveness and permanence, short-term effectiveness, implementability criteria of the NCP. The interim response actions selected in the IRODs represent the alternatives that provide the best balance of meeting these criteria. EPA will employ the "observational approach" to continue to evaluate these interim remedial actions' effectiveness in meeting these NCP criteria, EPA's remedial action objectives and performance standards and to determine what, if any, additional final remedial actions are necessary to ensure that human health and the environment are protected against unacceptable risks posed by hazardous substances remaining at the Site.

Comment 6:
A number of commenters are concerned about EPA's estimate of costs to be expended at the Summitville Site are too low. Commenters have calculated those costs (both removal and remedial) as exceeding EPA's $120 million estimate. They are concerned that the staggering amounts for interim response do not include the cost of the final remedy or remedial investigation/feasibility studies presently being conducted at the Site.

Response:
The commenters are correct in their observation that EPA's initial cost estimate has been exceeded with the collective costs of the interim remedial actions selected in the IRODs. The alternatives selected in the IRODs were screened for cost, and EPA believes that they are cost-effective. As studies at the Site provide additional information and as remedial actions are implemented, costs for remediation of the Site will continue to be reassessed.

Comment 7:
Commenters object to the backfilling of the Mine Pits and the plugging of the Reynolds Adit, since in their view, these actions preclude a future beneficial use, that of re-mining. The commenters believe that EPA's remediation activities should be immediately terminated or suspended until the impact to future mining uses can be thoroughly evaluated.

Response:
None of the proposed or completed EPA activities preclude further mining activities at the Site. However, any future mining activities must be consistent with and not interfere with the response actions EPA has implemented at the Site. EPA's remedial actions are intended to prevent the exposure of humans and ecological populations to hazardous substances. Any future mining activities that do not exposure these populations to hazardous substances may be acceptable to EPA. It is anticipated, however, that EPA will have to review any future mining plans to ensure the protection of human health and the environment.

Comment 8:
Commenters object to EPA's lack of a comprehensive Record of Decision for the Site and the implementation of parallel or isolated and disjointed actions at the Site without any overall plan or remedial strategy for the Site. To remedy this lack of coordination, the commenters suggest that an independent board of technical experts review and select Site response actions.

Response:
EPA believes that the interim remedial actions selected in the IRODs provide a comprehensive, coordinated approach to addressing the risks at the Site. Specifically, EPA believes that all the remedial measures to be implemented according to the IRODs will go a long way in improving sitewide water quality by controlling surface run-on and run-off, erosion, leaching and metals and other contaminant loadings to the Alamosa River.

Empowering an independent board of technical experts to review and select remedial actions at the Site is improper under the Superfund law. Congress explicitly charged EPA with the authority to select response actions to cleanup releases of hazardous substances under the CERCLA Section 121 of CERCLA. In fact, this section of CERCLA unequivocally state that "the President shall select appropriate remedial actions determined to be necessary to be carried out under section 104 or secured under section 106 which are in accordance with this section, and to the extent practicable, the national contingency plan..." [emphasis added]. The President has delegated that authority to select response actions at Superfund sites to the Administrator of EPA. The procedures the Administrator must follow in selecting these cleanup actions are contained the National Contingency Plan.[1] The NCP provides that affected and interested parties, such as States, PRP and citizens are given the opportunity to participate in the selection process, but it is clear that the Administrator retains the responsibility to select the appropriate remedy.

Thus, while EPA welcomes input from the community and neutral third parties concerning the actual health risks from lead-contaminated mining wastes, EPA cannot abrogate statutory responsibility to be the decision maker in selecting remedial actions for Superfund sites. EPA can also not allow a third party to determine the appropriate scope of EPA's remediation plan, since it is our experience in identifying health and environmental risks and designing the remedies to address them that Congress relied upon when it empowered us with the authority to select and implement remedial actions under Superfund.

Comment 9:
One commenter noted that downstream impacts are currently being ignored and avoided despite the above stated Remedial Action Objectives. Avoidance of downstream impacts adversely affects Terrace Reservoir, household and municipal wells and allows agricultural land to further degrade.

Response 9:
Due to the Chandler Adit drainage, all downstream targets are being addressed as quickly as possible. All three areas mentioned above are part of major research efforts included in the justification of remedial actions at the Site. Terrace Reservoir is currently undergoing a study conducted by the U.S. Geological Survey. Agricultural lands have undergone several studies, including those conducted by Colorado State University. With regard to household water use, local water supplies have been sampled twice and are undergoing long-term water sampling.

Comment 10:
The same commenter stated a site drainage plan, which provides control for surface/subsurface drainage, storm water and sedimentation management and non-point source collection/treatment, is needed.

____________________-

[1 See, e.g. Section 120(e)(4) of CERCLA (where if the head of the relevant federal agency and the Administrator of EPA cannot reach an agreement of the remedial action to be selected, the Administrator selects the remedy).]

Response:
A site drainage plan has been implemented. A copy of the plan is available in the Administrative Record.

Comment 11:
One commenter identified a need for a waste management plan.

Response:
A number of the IRODs have elements is designed to meet waste management ARARs. The Sampling and Analysis Plans describe how investigative derived wastes are managed. Also, used oil is being recycled and, as stated in the Focused Feasibility Study, sludge produced on-site is being recycled for metals recovery.

Comment 12:
One commenter is concerned that EPA does not have sufficient data to establish the Summitville Dam Impoundment (SDI) as a source of sulfide-rich tailings and metals-laden acidic water discharged to Wightman Fork. The lack of this data calls into question the need to remediate the SDI at all, or at least the nature and extent of such remediation. The commenter suggests EPA collect additional data regarding the nature and extent of contamination at the Beaver Mud Dump (BMD) and SDI before proceeding with remediation of these areas.

Response:
Historically, the Summitville Dam Impoundment and the Beaver Mud Dump area have been of significant concern to regulators from the State. Water discharges emanating from these materials has been recorded as being of poor quality. Based on existing data, historical precedent, and current sampling and analysis information, EPA determined that the SDI and BMD are significant contributors of man-made AMD at the Site. Data collected by Anaconda prior to SCMCI operations states that the mill tailings disposed of in this area are strong AMD generators. Movement of these sources and the Cropsy Waste Pile to the Mine Pits allows capping of four AMD sources in one action.

Comment 13:
One commenter argues that the FFSs and Proposed Plans fails to comply with the NCP because: (1) these documents evaluate the "No Action" alternative for the Site as a whole, rather than by the subject matter of each interim remedial action, (2) they fail to consider naturally-occurring background concentrations of metals and acids in EPA's analysis of alternatives, and (3) compliance with ARARs and/or ARAR waivers have not been identified with any amount of specificity.

Response:
Alternative No. 1 for each of the Focused Feasibility Studies is a No-Action Alternative related to that particular portion or media of the Site.

Naturally-occurring background levels of metals and acids were taken into account when evaluating ARARs for the interim remedial actions. For example, EPA determined it was appropriate to waive the Segment 3b stream classification as an applicable requirement that must be met by the IRODs because of the historic contributions of metals and acids from naturally-occurring sources. EPA will determine if this ARAR should be waived in any final ROD(s) for the Site when additional background and load reduction information is collected.

Comment 14:
Cleveland-Cliffs Iron Co. and Union Pacific Resources Company submitted information regarding their (or their predecessor-in-interest's) operations at the Site, their analysis of the current state of CERCLA case law related to liability and legal arguments evaluating their liability at the Site. These commenters also requested that EPA refer to the area adjacent to the Beaver Mud Dump, which EPA has referred to as the Cleveland-Cliffs Tailings Pond, as the Summitville Dam Impoundment or some similar appellation.

Response:
While EPA appreciates information regarding parties' prior activities at the Site, particularly if this information supplements EPA's CERCLA 104(e) information requests or helps EPA to characterize the wastes at the Site, EPA believes a submission that purports to provide comments on an FFS and Proposed Plan is an inappropriate forum to state one's view of its liability at the Site. Such comments are more appropriately submitted as part of a party's response to EPA's CERCLA Section 104(e) request, EPA's Notice Letter or in confidential settlement correspondence between EPA and the submitting party. A specific response to Cleveland-Cliff/UPRC's legal arguments will be forwarded under separate cover.

Without any qualitative judgment on the merits of Cleveland-Cliff/UPRC's legal arguments, EPA nonetheless agrees to hereafter refer to the area below the Beaver Mud Dump as the Summitville Dam Impoundment. Corresponding changes to this nomenclature will be made in all future EPA documents.

RESPONSIVENESS SUMMARY: GENERAL WRITTEN COMMENTS RECEIVED FROM CITIZENS AT LARGE OF THE SAN LUIS VALLEY

These written comments represent the universe of comments received through the end of the public comment period.

Comment 15:
To whom it may concern: My name is Roger Gallegos I have lived in the San Luis Valley just about all my life. Before the Summitville Mine came to exist, life was good. After they exploited the government and us, life became much more difficult. Take for instance, when we would water our fields, we could catch fish in our ditches. Another thing I have noticed is the crop yield. Before the mine came in my meadow would yield 3000 to 3200 bales of hay. When the mine had there spills I yielded 1642 bales. My best year while the water quality improved was about 2853 bales. Now this may not sound important, but it is. I used to sell hay for a living, and now I feed it to my cows. The mine has hurt my family in the pocketbook. We have all been hurt by the mine in this community. The government should never have let them start to begin with. Galactic Mining should be made responsible for the clean up. Then the Government for allowing them to do this. Since the mining company has gotten away with this, we should not be made to suffer for other peoples mistakes. I say Summitville should be cleaned up and restored, and our water be put back to normal. My Great Grandfather made a living with my ranch, as did my Grandfather and Dad. I want my kids and their kids to continue making a living on what is theirs. They have that right, and not be forced to suffer for what someone else was allowed to do. I myself believe the plan to filter the water down below where the creeks meet, is the best idea. That system for 8 million, could save money and work.
Thank you for listening. The Gallegos Family. [Letter, undated; no other data given]

Comment 16:
Dear Ms. Williams: As a farmland owner with land irrigated from the Alamosa River I am deeply concerned and worried what the continued use of the contaminated water will eventually do, not only to the land, drinking water from the wells, but also to the livestock and products which are ultimately consumed by the general public. There are those who say it has no ill effects on crops or livestock - but for how long. I do know it has played havoc with the steel structures in the irrigation system. I'm under the Capulin Ditch and we have had to spend over $40,000.00 replacing all steel structures. I may say that I was Water Commissioner for this district and know the Alamosa River quite well. In this time I never saw when so many irrigation structures all deteriorated in such short time. As for those who say there never were any fish in the Alamosa River - it is not true. Why else would the Game and Fish Department consider it a fishing stream. People would ice fish all winter in the Terrace Reservoir up to the time the mine started to dump the mess into the stream. I have lived here all my life and can remember when we were little Dad would take us fishing there. As for the different options to solve the problem it seems to me one that would treat all the water before it got into the Alamosa River would be the one - probably in just one pond. Thank you Sincerely, Leo B. Gonzalez [Letter; dated Oct. 19, 1994; address and phone number given]

Comment 17:
Dear Ms. Williams & EPA Summitville Team: Although I may be writing too late for the case record, perhaps your comment period's been extended; in any case, the information leading me to voice my concerns reached me after the original deadline. Your recommended plans generally seem to stress reliance on systems that won't need too much up-keep once set in place. The biotreatment aspect sounds favorable. However, it has come to my attention that "caps" or "plugs" contributed to poorer water quality late in this year's irrigation season, since the caps rechanneled contaminated water into other drainage channels that weren't serviced by your water treatment facilities. This indicates two planning factors to me: 1. You'll want to assess where water will eventually seep out before you start filling the mine pits with waste materials that are likely to displace ground water, and 2. It would make most sense to locate your water treatment unit(s) as far downgradient as possible, even if this entails relocation of the existing facilities. I was also surprised that the reclamation plan *mentions no reseeding or tree transplanting details. Although it may or may not mean anything scientifically, I notice that the Alamosa creekbed's rocks have a much less "rusty" surface coloration near my house than they ever did during SMC's last four years. Thanks for your efforts. Sincerely, Paul Sinder [Letter; dated 9/27/94; address given]

Comment 18:
To Laura Williams: I am writing to voice my concern on the clean-up efforts being taken at the Summitville Minesite. Mainly, I would like to state that I fully support the alternatives researched and proposed to you by the T.A.G. committee. I hope the E.P.A. system is flexible and the T.A.G. proposals not only be reviewed, but also implemented. I thought the public meeting on October 12th, was very informative and positive. It led me to believe that, although you have plans made and on paper, you are open to suggestions, criticism and change. The T.A.G. proposal on water treatment is to my opinion a priority. It will make an immediate difference in the water quality coming downstream and into our valley. I do hope this will be realized as soon as possible, it seems common sense. Looking at the T.A.G. proposals, I think they have found several solutions which promise more lasting and better results (and in some cases a smaller price tag). A question

I have too, is whether the E.C.C has the experience to tackle the job up there. How many other experts and companies have been approached for their expertise and advice? I am optimistic that you will find a way of working together with the T.A.G. team in finding the right solutions. I appreciate the work you are doing and am keeping my fingers crossed that all goes well. I realize it's a tough and very complicated job. Sincerely Lisa ter Kuile A rural resident surrounded by Terrace irrigated land. [Letter; undated; no other data given]

Comment 19:
Dear Ms. Williams: We want to support the recommendations made by the TAG for the Summitville Minesite. We are concerned here in Conejos County about water quality and the long term effects of the Summitville Minesite. We want the agricultural community in our county to remain stable so our role as County Commissioners must look toward the future and address the long term consequences connected with this site. Please take the TAG recommendations seriously, the quality of our land and water will determine the future of our community.
Sincerely, Le Roy Velazquez, Chairman Conejos County Commissioners [Letter; dated October 18, 1994; typed on Conejos County Government letterhead]

Comment 20:
Dear Ms. Williams: We, as Board of Directors of the Valle del Sol Community Center in Capulin, are extremely concerned about the Summitville Minesite and its continuation clean-up efforts. We are very interested in the quality of our water for our homes as well as for our farms. We support the enclosure made by the Technical Assistance Grant Committee. We have showed our interest by making our community center available for meetings so that the community will continue to be informed and to participate in the process. If there is anything else we can be doing, please let us know. We are full aware that the results of the Summitville Minesite on the quality of our water will determine our livelihood in Capulin.
Sincerely, Valle del Sol Community Center Board of Directors. [Letter; dated October 18, 1994; five signatures, spelling approximate: Rev. Randy Brennig, Delma Ramirez, James A. Quintana, Cindy Medina, Julia Gomez-Nuanes; typed on Valle del Sol Community Center letterhead]

Comment 21:
Dear Ms. Williams, After reading the TAG newsletter and listening to Maya ter Kuile, I have some misgivings about the E.P.A. plans for Summitville. The TAG suggestions surely seem much more reasonable and straight forward than the EPA's approach. Their cost effectiveness seems much more desirable also. As a new resident to the area I urge you to look again at what has occurred to the Alamosa River; consider all of us who drink and irrigate in this area and rethink your approach to what you (i.e. EPA) are doing at Summitville.
Thank you [Letter; dated 21 Oct 94; unreadable signature; address given]

Comment 22:
Dear Ms. Williams, I am writing you to voice my support for the Technical Assistance Grant Committee's response to the EPA's action plan for clean-up of the Summitville Minesite. I encourage your department to work with the TAG Committee for a thorough clean-up operation with SLV citizen input. Thank you for your consideration.
Sincerely, Susan Sawyer [Letter; undated; address given]

Comment 23:
Dear Ms. Laura Williams, I am writing concerning the Summitville mine clean-up. I attended and appreciated the meeting on Oct. 12, where the EPA presented their progress and future for clean-up, and the TAG presented their answer and their suggestions on how to improve the current trend. I have heard and read both sides of the issue, I, as do the residents of this community, appreciate the work and the concern that the EPA has shown to clean up this mess. Receiving Superfund status at such a fast rate was excellent. We are really grateful to the organization. My concern, as most of the community's, is the form in which the clean-up is being performed. Some things were done in obvious haste due to the situation and the consequences are now being observed i.e.: the Reynolds adit plug and the Chandler adit leak. The best thing to do, I believe, is to sit back and really assess the situation before any more mistakes are made. The TAG has gone up there, researched the situation, consulted with experts and presented a different point of view. I listened to both sides (EPA versus TAG) and came to the conclusion that the TAG had much better and faster results than the current method. I was much more comfortable with the research done by the TAG group, seeing that it was done more in depth and with well experienced experts. The cost, being of great concern to many, would also be less if you reviewed the TAG group's point of view. There are many that say that this river has always been polluted. Most of these people do not reside close to this river or even in the vicinity. Many live in other counties. I, as many other people in this community did, fished, not only in this river but also on Terrace Reservoir, not too long ago (1984-85). This river has not always been polluted. Maybe it's had it's ups and downs, but it has never been dead. Not only do fish not exist any more but algae can't even grow any longer. I am stating this because I have heard of people wanting the EPA to pull out, saying that this river has always been polluted. These people do not know the facts and magnitude of the damage that can occur and won't see into the future at what will happen to this valley if nothing is done. I really hope that you really take careful consideration on all our letters, and take the TAG group's suggestions seriously and

implement their ideas. Thank you for your time and hope you will have another update meeting soon. Sincerely, Nitschka ter Kuile and Steven Miller Home and Land Owners, 1/4 mile from Alamosa River. [Letter; dated Oct 20, 1994; other data not given]

Comment 24:
Dear Ms. Williams: I have reviewed the TAG committee's recent newsletter and have discussed the feasibility studies that were done and submitted to the E.P.A. with a TAG committee member. I would like to comment. First, I would like to tell you that our farm has been in our family for five generations. It is irrigated with water from the Alamosa river which flows through our farm. My husband and I worked for over forty years to purchase various parcels of land to make up what is now the present 435 acres. It would be a severe financial loss to my family and to the other farm families here to be forced to abandon our farms should the water quality of the Alamosa become incompatible with safe crop and livestock production. I feel the TAG committee has done an excellent job in their feasibility study and in the suggestions they have made. I urge the E.P.A. to consider water treatment to become a top priority and to take the TAG committee's suggestion to build a water treatment plant at the bottom of the Minesite, rather than to continue with the current treatment plan, which is not only more costly, but would delay the treatment of the water in time to prevent damage to thousands of acres of farmland.
Sincerely yours, Leola T. Miller [Letter; dated October 20, 1994; address given]

EPA RESPONSE TO IT COMMENTS RECEIVED FROM CITIZENS AT LARGE OF THE SAN LUIS VALLEY

EPA will address citizen written comments in one response. All but one of the citizen comments expressed direct concern with water quality issues as related to water quality conditions in the Alamosa River resulting from mining activities at the Summitville Mine. Many citizen comments received expressed support for the TAG committees' recommendations, particularly regarding the location of the existing on-site Water Treatment Plant and associated costs.

EPA appreciates the fact that citizens have taken the time to attend the public meetings and review the proposed plans and recommendations. EPA feels that citizen input is a component of the decision making process and the concerns raised regarding water quality are valid and deserve consideration. EPA, further recognizes the time and effort expended by the TAG to evaluate the proposed plans and develop constructive recommendations. As with citizen involvement, EPA realizes that impartial technical assistance provides value in the decision making process.

EPA is also cognizant of water quality issues which are central to human health, agricultural impacts, and activities related to fishing, recreational or otherwise. EPA agrees with citizen concerns especially as they relate to water quality.

It is the intent of EPA to integrate recommendations made by the TAG into the final consideration of alternatives. These may be especially pertinent to specific elements of the Site Reclamation options. In a letter from the Forest Supervisor of the San Juan/Rio Grande National Forest dated October 17, 1994, the Forest Service expressed agreement-in-principle with the preferred alternative g4 for site reclamation, stating that "it certainly seems to be the most reasonable and cost effective in terms of restoring the area to a productive capacity".

The letter also stipulates that, pursuant to the current Master MOU (Memorandum of Understanding) between EPA and the USDA Forest Service, the Forest Service agreed to "provide expertise related to natural resource management and protection...". In response to the proposed plan for site reclamation, the Forest Service has offered expertise, "particularly in the area of soil/surface reclamation", based upon its "considerable experience in conducting high elevation reclamation". EPA feels that recommendations made by the Forest Service are valuable and will be carefully considered in final selection of specific elements of the reclamation plan, particularly those relevant to revegetation.

Regarding the alternatives for water treatment, EPA recognizes TAG concerns in discriminating between Alternative 5 and Alternative 6 and TAG suggested modifications to Alternative 6. EPA further recognizes similarities between the two alternatives. EPA acknowledges TAG efforts in acquiring cost estimates from potential vendors. Relevant to costs for constructing a new water treatment facility, EPA is cognizant of potential difficulties associated with acquiring broad-based cost estimates from potential vendors who may or may not be as familiar with site-specific conditions. Site specific conditions can dramatically affect proposed costs regardless of the experience and intentions of potential constructors. However, EPA will take TAG recommendations under advisement and continue to seek comment from TAG members.

2.4 Summary and Response to ARARs Comments

Comment 1:
Another commenter questioned the elimination of biomass and ultrafiltration alternatives from further elevation in the WTFFS and IROD. The commenter argued that these alternatives should not be eliminated from consideration because, without establishing ARARs, EPA cannot be certain that "further contaminant removal may not be warranted." Similarly, electroplating is eliminated for detailed alternative analysis since the "currently used technology does not produce a concentrated liquid waste stream." The commenter argues that the WTFFS should have considered the possibility of modifying current treatment processes so there would be a concentrated waste stream acceptable for electroplating and metals recovery.

Response:
EPA established the sitewide ARARs that must be met in the ARARs Addendum to the HLP ITS. EPA incorporated these ARARs by reference to the WTFFS as well. While EPA agrees that this approach may have confused the commenters on the federal and state law requirements and regulations (or portions thereof) that were applicable or relevant and appropriate to the various IRODs, each IROD now contains a separate and complete discussion of the ARARs that must be met by the interim remedial action selected.

Since the sitewide ARARs had already been identified in the "ARARs Addendum to the HLP Focused Feasibility Study Report", this further refinement of ARARs as they relate to each of the IRODs represents only a minor change to each FFS and Proposed Plan. Consistent with its "Interim Final Guidance on Preparing Superfund Decision Documents", OSWER Directive 9355.3-02 (June 1989), EPA has determined that this minor change will have little or no impact on the overall scope, performance, or cost of each alternative as originally presented in each FFS or Proposed Plan.

The commenter should also note that EPA may eliminate interim alternatives on the basis of cost if other interim action alternatives are effective and satisfy the interim objectives and goals. EPA eliminated the biomass, ultrafiltration, and electroplating alternatives on the basis that the cost were grossly excessive when compared to their overall effectiveness. See 40 C.F.R. s 430(e)(7)(iii) and "Guidance on Feasibility Studies Under CERCLA," EPA 540/G-85/003 (June 1985).

Comment 2:
In reviewing the HLP FFS, one commenter noted that Alternative 5-3 states that the cyanide concentrations in solution effluents can be reduced to below 100 ug/l. The commenter noted that although the HLP FFS identifies the chemical specific ARARs for surface water as standards promulgated for segment 3b of the Alamosa River, there is no discussion on how cyanide concentrations from the HLP will be reduced to meet this ARAR. The commenter requests that EPA provide the calculations which support EPA's conclusion that the cyanide concentration will be diluted by flows from Wightman Fork and the Alamosa River in order to meet the chemical specific, stream classification ARAR.

Response:
The chemical specific ARARs are the basis for the cyanide concentration/dilution calculations. The calculations serve to quantify the assimilative capacity of Wightman Fork and the Alamosa River at differing flows. The basis for these calculations and EPA determination that the interim remedial actions will attain the chemical specific ARARs, including those for cyanide, is discussed further in the ARARs section of the HLP IROD.

Comment 3:
A number of commenters noted that the ground water ARARs are also poorly defined, causing EPA difficulty in determining whether groundwater ARARs can be met by EPA remedial activities. These commenters challenged EPA's adoption of surface water quality standards for ground water resources, citing a lack of data. Commenters noted the fact that surface water consists of snow melt and storm water runoff, plus baseflow contributions from ground water sources. The commenter argued the Site has historically exhibited high total dissolved solids (TDS) in the ground water and that EPA has not adequately characterized other background water quality conditions. Water quality data from surface water sources typically shows less TDS than from ground water tributary sources. The commenter believes EPA has failed to account for this data in selecting ground water quality standards.

Response:
EPA has determined that the classification prescribed by the Colorado Ground Water Standards is applicable or relevant and appropriate to assessment of standards to groundwater at Superfund sites within Colorado. Since the Colorado Water Quality Commission has yet to classify the Sitewide ground water, numeric ground water standards are not currently applicable or relevant and appropriate to ground water quality at the Site. The interim ground water narrative standard adopted by the Colorado Water Quality Control Commission on July 29, 1994, however, is applicable to the Site. This standard, which became effective on August 30, 1994, requires that the ambient water quality as of January 31, 1994, continues to be met. This ARAR will be met by

compliance with EPA's interim action levels and with all surface water quality ARARs, as discussed in each of the IRODs.

EPA, like the commenter, moreover, recognizes the hydrological interconnection between the surface and ground water flows at the Site, particularly during baseflow periods. EPA expects, therefore, that once the CWQC completes its use attainability study and classifies Site ground water, this classification will be applicable to the Site. This ARAR will be attained by the final remedial action(s) for the Site.

Comment 4:
Two commenters objected to the use of RCRA Subtitle C performance standards and design criteria for containment of existing waste rock, spent ore, and tailings at the Site,

Response:
While EPA agrees that RCRA Subtitle C requirements are not applicable to "Bevill exempt" wastes, i.e., those from the "extraction, beneficiation, and processing of ores and minerals," EPA has determined that RCRA Subtitle C requirements may be relevant and appropriate to actions at CERCLA mining sites if the mine waste materials are sufficiently similar to RCRA hazardous waste, particularly if the subject wastes fail the Toxicity Characteristics Leachibility Procedure (TCLP) or exhibit other characteristics of RCRA hazardous wastes (e.g., low pH). See, "Superfund Guide to RCRA Management Requirements for Mineral Processing Wastes, 2nd Edition," OERR Directive 9347.3a-12 (August 1991). Further, if the disposal activity involves the use of a waste management unit sufficiently similar to a RCRA regulated unit, and the unit is to receive wastes sufficiently similar to RCRA hazardous wastes, the RCRA Subtitle C requirements pertaining to that type of waste management unit would be relevant and appropriate. (See 55 Fed Reg. 87630.)

The portions of the RCRA Subtitle C performance standards and design criteria that are relevant and appropriate to EPA's interim remedial actions at the Summitville site are identified in the CWP, HLP and Reclamation IRODs.

Comment 5:
Commenters question EPA's use of the most stringent stream classification - that of Segment 3b of the Alamosa River - as the controlling surface water and ground water quality ARAR. They state EPA has adequately explained why it has selected this stream classification as the "controlling" standard. Further, commenters argue that the numeric criteria based on the most stringent stream classification does not account for the lower classifications of other stream segments or for high background levels of copper, zinc and other hazardous substances in the Wightman Fork and Alamosa River which are the result of naturally occurring oxidation and transport processes acting upon highly mineralized, unmined and unprocessed rock in the area. EPA, they opine, cannot remediate water quality below naturally-occurring background levels. Lastly, commenters argue that the State erred in designating Segment 3b of the Alamosa River as Class 1 Cold Water Aquatic Life, and that this standard can never be attained because of background levels of metals. They suggest that EPA waive this flawed classification based on the technical impracticability of achieving these water quality standards and the State's failure to consistently apply them, as evidenced by the creation of NCLs in the permit and 1991 Settlement Agreement.

Response:
First, the commenters should understand that despite a Class 2 designation in Terrace Reservoir (Segment 8), Segment 8 carries hardness-based TVS as the ambient standards. Because the hardness in the Alamosa River decreases with increasing distance from the water treatment plant at the Summitville Site, the ambient water quality standards in Terrace Reservoir (Class 2) are more stringent than those assigned to Segment 3b (Class 1).

The commenters should also note that the CWQCC originally proposed to upgrade Terrace Reservoir to Cold Water Aquatic Life Class 1 but declined because of limited data. In fact, review of Exhibit 12 to November 1, 1993 hearing held by the CWQCC in Alamosa, reveals the intention to collect needed data and review suitability for upgrade to a Class 1 designation As stated in the HLPFFS, at this time EPA believes that employing the Segment 3b standards will contribute to attaining Class 1 uses in Terrace Reservoir and should contribute to attaining the existing, more stringent, hardness-based TVS assigned to Terrace Reservoir.

As the commenter is aware, the re-evaluation of water quality standards in Colorado streams, rivers and reservoirs is an ongoing process controlled by the Colorado Water Quality Control Commission (CWQCC). In its discussion, EPA specifically recognized the inconsistencies and concluded that the Colorado Water Quality Standards (CWQs) for Segment 3b of the Alamosa River, as the applicable ARARs, will serve as the numeric interim remedial action goals for the Site.

At this time EPA does not have a basis for usurping the CWQCC authority to determine appropriate classification and water quality standards for the Alamosa River and its tributaries. As additional data is gathered and the effects of the interim actions are quantified, it is within the CWQCC's authority to address all of the issues identified in these comments. Until that time, EPA will use the existing standards as numerical goals for the remediation.

In the HLPFFS, EPA made its intention to attain surface and ground water quality ARARs at Segment 3b of the Alamosa River clear. The attainment of the ARAR for Segment 3b will be monitored using a "bubble" approach at the downgradient boundary of the Site, monitoring point 5.5 in the Wightman Fork (WF 5.5). In this way, no single interim remedial action alone is expected to bear the burden of ARARs attainment.

Where the action-specific ARARs associated with interim remedial actions at the Summitville Site require identification of an ambient-water-quality-based-end point (i.e. NPDES point source permitting), the applicable CWQSs for Segment 3b are established using a model to back calculate compliance at WF 5.5. This modeling resulted in EPA's establishment of interim action levels (IALs).

As noted in the HLPFFS, given the active interchange typical of alluvial ground water and surface water in high mountain valleys, EPA has determined that attaining compliance with surface water quality ARARs and the ground water interim narrative standard will protect both surface and ground waters. This interchange will only compel groundwater cleanup to the extent required, in combination with other actions, to attain ARARs at the point of compliance (WF 5.5) and thereby meet the standards established for Segment 3b.

The commenter should also be aware that the background concentrations of metals and acids have been considered. At the triennial review of the Rio Grande Basin the Colorado Water Quality Control Commission (CWQCC) did recognize that background metals concentrations in Segment 3a can be attributed to natural acid mine drainage from Iron, Alum and Bitter Creeks. Consistent with those findings, the CWQCC promulgated standards in Segment 3b which reflect the elevated background concentrations and the wider pH range documented in Segment 3a. EPA believes it has made its reliance on the CWQCC's work very apparent in the table on page 3-6 of HLPFFS (see the values for chronic copper and chronic iron).

EPA did not participate in the development of the NCLs. These negotiated numbers are not duly promulgated and they are not the result of applying site specific data to duly promulgated NPDES requirements (i.e. mass balance, low flow, etc.) to establish a discharge limit. The NCLs may indicate the appropriateness of a waiver at some time in the future, but at the present EPA will reserve judgement on the use of and scope of waivers.

The EPA believes that, as an objective, the protection of the Alamosa River as habitat for a diverse range of cold water aquatic life is appraise until the combined effects of the interim actions come into effect. Although it is impossible to precisely quantify, EPA believes that when the combined, beneficial effects of the IRODs are realized, ARARs will be attained in Segment 3b of the Alamosa River.

At that time, EPA will be able to better quantify the results and determine if additional action or waiver is required. Likewise, the CWQCC will have another opportunity in three years to evaluate the results of the interim RODs and use its own use attainability authorities and ground water site-specific classifications to adjust standards accordingly.

2.5 Summary and Response to Reynolds and Chandler Adit Questions

Although the Reynolds and Chandler Adit system is not a part of the current focused feasibility studies, EPA recognizes the actual and potential contribution that this system may provide to overall AMD contamination at the Site. Of the four FFSs, the Adit system is of most importance to the Cropsy action since it is known that precipitation - approximately 72 million gallons per year - and ground water were funneled by the Mine Pits into the historic underground workings. The Adits previously drained this water (now ground water) from the mine workings which are interspersed throughout the sulfide ore body. Contact with the sulfide ore resulted in the transformation of the natural precipitation/ground water into AMD. This AMD then exited the Reynolds Adit and flowed into the Wightman Fork stream.

As part of ongoing emergency activities, it was determined that the continual generation of AMD from the Reynolds Adit could be substantially reduced by plugging the Adit system. (See Attachment F to Summitville Action Memorandum #2 dated January 28, 1993.) This would result in the re-establishment of the historic ground water table, thereby eliminating oxygen from the mine workings/Adits. Concurrent evaluation of alternatives to address the Cropsy Waste Pile included moving the CWP to the Mine Pits from which it was originally excavated. Overall evaluation of the two actions (Reynolds and CWP) strongly favored the filling and capping of the Mine Pits to prevent water infiltration through the sulfide ore body.

If the evaluation of the two actions had been unfavorable, it is likely that the Mine Pits would have needed to be regraded and a drainage notch constructed to reclaim the area. The movement of the waste piles to the Mine Pits, therefore, has actually resulted in a cost savings overall since the CWP remedy meets the needs of both portions of the Site. In addition, the reduction in volume of AMD generated by CWP and the Adits system will result in the decrease of Water Treatment required at the Site and, therefore, costs for this third action. Evaluation of the Adit plugs and the re-establishment of the ground water table is ongoing and the information developed will be incorporated into RI/FS documents to support a separate Reynolds Adit/South Mountain ground water ROD.

The evaluation of the two actions was discussed in Attachment F of Action Memorandum #2 and section 5.0 of the EE/CA for the Cropsy Waste Pile, et al. An interim project report on the Reynolds and Chandler Adit plugs was released on October 12, 1994. Each of these documents is included as part of the Summitville Administrative Record and is available to the public.

Comment 1:
The discussion in all the FFSs regarding AMD concentrations/volumes attributed to various sources should have provided a detailed analysis of the chemical mass balances associated with water quality in and adjacent to the property [Summitville Site].

Response:
As Tables 1-4 of the FFSs plainly demonstrate, there is not a steady release of chemicals over time with which to develop chemical mass balances. The bulk of the contaminants are released during periods of high surface water flow such as spring snowmelt or large storm events. As discussed in section 1.3.2.3 of the FFSs, such an attempt is further complicated by the varying nature of the geologic features encountered at the Site. To attempt to develop a chemical mass balance for each chemical and geologic feature for the various time frames does not add any greater understanding of the risks presented by the Site.

Comment 2:
There is concern associated with backfilling of the Mine Pits (with CWP, SDI, and BMD waste materials) since the data suggest that the Mine Pits and the Reynolds Adit are hydraulically interconnected. Because of this hydrogeological connection, a greater understanding regarding the geochemical interrelationship should have been undertaken prior to commencing backfilling activities.

The combined impacts of implementing these two actions is still unaddressed, despite the fact that the combined efforts could well be the reason that another or other alternatives would be preferred.

Response:
EPA agrees that the hydraulic interconnection between the Mine Pits and the Reynolds Adit is an area which bears special attention. If the ground water table - as a result of the Adit plugging - were to rise above the level of the Mine Pits, then the relocated waste piles could be subjected to a varying saturated condition. Because of this concern, EPA placed a continuous three-foot (finished thickness), highly-impermeable clay liner on the bottom and all sides of the Mine Pits. Placement and subsequent compaction by normal construction traffic of the waste piles appear to have resulted in impermeable waste piles. As a result, it is EPA's assessment that saturation of the relocated waste piles is unlikely to occur as a result of infiltration by the ground water table.

A final cap over the Mine Pits is intended to divert surface infiltration so that saturation of the piles does not occur as a result of precipitation events. The cap also serves to eliminate oxygen, which is required for AMD generation, from entering the waste piles.

As a precautionary measure, a continuous five-foot layer of lime kiln dust was placed over the clay liner for both the North and South Mine Pits (approximately 1,800 tons of lime kiln dust). The lime kiln dust is intended to neutralize any AMD generated as a result of moisture present within the waste piles as they are excavated and placed, and AMD generated by precipitation events occurring during construction. In addition, any surface water infiltration which may occur through the interim caps over the winters of 1993 and 1994 will also be neutralized.

Should the waste piles become saturated despite the design and construction safeguards described above, any AMD generation within the Mine Pits would take place under saturated conditions in a high pH environment (high pH as a result of dissolving the lime kiln dust). As with the ore body, this saturation would result in the elimination of oxygen from the waste piles. This lack of oxygen would prevent the generation of AMD. While a more detailed geochemical discussion may be useful for actual design considerations, it can generally be understood that the sulfide ore body below the Mine Pits presents the highest AMD generating potential for the entire Site. If saturated conditions can minimize the AMD reaction for the sulfide ore body, then the same conditions will also minimize AMD reaction within the lesser sulfide-containing waste materials.

Comment 3:
This section [1.4.1.3 of the CWP FFS] indicated that the Reynolds and Chandler Adits have been plugged, but that the long term effects of plugging the Reynolds Adit and Chandler Adit, and the consequent rise in the South Mountain water table have not been determined.

EPA indicated in its response to comments on the EE/CA that a state-of-the-art groundwater flow model that accounts for flow in fractures is being developed in order to perform such evaluations. However, the Reynolds Adit was plugged prior to completion of such a groundwater flow model evaluation and any publication of results of such evaluations.

Response:
The intent of the "long term effects" statement was to convey that EPA does not definitively know the actual long-term effects which the plugging will achieve since plugging was only recently completed in March 1994. However, the referenced model has been able to provide an approximation of the resultant ground water table. At this time, a report on the findings of this model is in the final stages of review prior to its release to the public.

The development of the model was never expected to be completed prior to commencing plugging activities. Instead, it was anticipated that the model would be used to study the effects of changes in site conditions (i.e., removal/remedial actions) on the ground water and Adit system. The model has only recently achieved a relative level of accuracy and is now being evaluated based upon actual field conditions. Because the Adit pluggings were conducted as a time-critical, removal action, no formal public review process was required, though the alternatives analysis for the Reynolds Adit has been a part of the public record since January 28, 1993.

Comment 4:
Plugging of the Reynolds Adit should have been evaluated as a long-term solution at the Site rather than an Interim Remedial Action (IRA). Plugging of the Reynolds Adit could cause the following: (1) increase of the water table into the Mine Pits, (2) groundwater to exit the mountain via another shaft or adit (as was the case with the Chandler Adit), and/or (3) the creation of additional point sources of Acid Rock Drainage (ARD) through seeps.

Response:
As discussed previously, the Reynolds and Chandler Adits were plugged as a time-critical, emergency removal action. However, this does not imply that the plugging of the Adits is considered to be interim in nature. After initial consideration by EPA of the three potential effects as listed by the commenter, EPA felt it best to evaluate the impacts to the ground water table and the actual performance of the plugs as a whole system. As more about the South Mountain ground water regime is known, then a final decision regarding the regime can be developed for long-term considerations.

Comment 5:
EPA apparently has not performed adequate groundwater investigations to evaluate the short- and long-term effects of the Reynolds Adit plugging. Because of the complexity of the groundwater flow system at the Site, as related to fracture flow and the hydrogeologic significance of the mine workings and adits, a groundwater flow model is necessary to evaluate rises in the groundwater table and the potential for significant groundwater discharges through existing adits and shafts. Such modeling efforts must take into account the effects of fractures on groundwater flow characteristics, groundwater recharge primarily through the Mine Pits before and after filling and capping, groundwater discharge seeps, and other significant hydrogeologic boundary conditions such as the underground workings.

Response:
EPA agrees that the South Mountain ground water regime is complex in nature and can have significant impacts upon the various actions discussed for the Site. As a result, EPA has directed the development of a state-of-the-art, three-dimensional model with assistance from the Office of Surface Mining. Each of the parameters identified by the commenter and other considerations have been incorporated into development of the model. The model has only recently achieved a relative level of accuracy and is now being evaluated based upon actual field conditions. It is anticipated that the model can be developed into a predictive tool for evaluating future actions to be taken at the site.

Comment 6:
As anticipated by individuals commenting on the EE/CA, plugging of the Reynolds Adit in February 1994 apparently caused discharge of groundwater through the existing Chandler Adit thus providing another source of ARD. As a result, EPA plugged the Chandler Adit in March 1994. Shortly thereafter, the plug began leaking low pH metals-laden waters. An explanation for the failure of the Chandler Adit plug is not discussed in the FFS. Failure of the plug could be primarily a result of one or both of the following flaws in establishing the plug design parameters: 1) failure to use conservative hydraulic parameters, such as using the maximum possible hydrostatic head expected at the plug that would result from plugging of the Reynolds Adit; and 2) failure to select suitable competent rock for keying the plug. This section also mentions that corrective measures are planned for the Chandler Adit, however, no specific discussion of the nature of the contemplated corrective measures is provided.

Response:
Concerns regarding potential discharge from the Chandler Adit once the Reynolds Adit was plugged did result in EPA including plugging of the Chandler Adit as part of the removal action. However, the work for both Adits was conducted in a concurrent fashion and was not based upon actual discharge observed from the Chandler. The Chandler did not fail until May 23, 1994, which is a sufficient amount of time after construction for the plug to have been fully effective.

EPA agrees that the subsequent failure of the Chandler plug is likely to be associated with the plug design or the surrounding rock conditions. The corrective measures for the Chandler are not discussed primarily because the plug failure was still being evaluated. This assessment effort was initiated in November 1994 and it is anticipated that work to repair or replace the Chandler Adit will be completed by Spring 1995.

Comment 7:
EPA should not repeat the same mistake of replugging the Chandler Adit without performing the appropriate hydrogeologic investigations and evaluations. Replugging the Chandler Adit may cause, as was the case in the Reynolds Adit plug, water exiting out of another adit or shaft or significant hydrostatic pressures in the mountain that would cause the development of multiple point sources via seeps at the base of the mountain. As indicated above, the Chandler Adit is presently discharging low pH metals-rich waters directly into Wightman Fork. It is not known why EPA did not open the valve in the Reynolds Adit to reduce or preclude flow from exiting the Chandler Adit and treat this in the PITS facility prior to discharge to Wightman Fork. This demonstrates a failure on EPA's part to develop an overall environmental strategy at the Site, as opposed to a number of disconnected and uncoordinated individual actions.

From an emergency response standpoint, it may have been appropriate to keep the Reynolds Adit open since water from the Reynolds Adit could be readily treated.

Response:
Based upon the short success during the time that the Chandler Adit was functional, it is unlikely that replugging of the Adit will result in discharges from other adits/shafts. The ground water model being developed tends to support this conclusion. However, it is known that historic seeps did exist on South Mountain and it is reasonable to expect that these seeps would redevelop. Even so, the rationale for plugging the Adit system was to flood the mine workings and thereby eliminate oxygen from the reaction which generates AMD. This will result in the gradual improvement of the South Mountain ground water and, therefore, the water quality of the seeps.

The design for the Reynolds Adit included two separate plugs with piping between the plugs. A valve which would allow EPA to drain the water behind the two plugs was to be installed once the second plug was completed. After observing the better-than-expected performance from the first plug, EPA determined that a second plug would be a redundant expenditure and it was eliminated from construction. As a result, the capability to open the valve - as originally considered - did not exist at the time that the Chandler began to discharge to the Wightman Fork. This valving capability has since been installed and EPA has been treating the Chandler discharge at the PITS facility. Rather than a lack of an overall environmental strategy for the Site, this incident is more representative of the extreme physical and timing realities presented by the Site. Overall, discharge from the Chandler Adit produced less flow and less copper concentrations than experienced from the Reynolds Adit during the same time flame of the previous year.

Comment 8:
Plugging the Reynolds Adit may not, in the long term, reduce acid mine drainage flows and may turn out to be a very expensive experiment. Also, this interim action may actually exacerbate site problems and, thus conflict with the National Contingency Plan.

Response:
Based upon current data gathering efforts and the recent predictive capability of the ground water model, EPA has determined that plugging of the Reynolds Adit will result in a reduction of contaminant transport from the Site. Therefore, these actions will not exacerbate Site problems or interfere with the final overall site remedy. However, should monitoring of the South Mountain ground water indicate that the plugging is actually exacerbating Site conditions, the (now installed) valve within the Reynolds Adit can be opened and treatment of the water initiated in the PITS.

Comment 9:
It is stated that "In 1993 and 1994, Emergency Response Removal Actions (ERRA) were taken to reduce contaminant load in untreated Site water. This was achieved in part by...prevention of AMD flow from underground workings..." Plugging the Reynolds Adit probably did not reduce the contaminant load in untreated Site water.

If no immediate reduction of contaminated water flows was expected, what was the rationale for the precipitous action in 1993 and 1994 regarding plugging of the Reynolds Adit? Alternative actions and consequences of combined actions could have been evaluated on sound scientific bases thus providing for recommended alternatives with higher expectations of achievements for interim remedies and final overall site remedies.

Response:
In the spring of 1993, discharge from the Reynolds Adit reached a peak flow of 763 gallons per minute with supersaturated concentrations of copper. Due to treatment capacity limitations at the PITS facility, approximately 600 gallons per minute of the discharge overflowed the holding pond and escaped untreated into the ground or overflowed into the nearby creeks. While this occurred over a limited 3-4 week period, plugging of the Adits eliminated this highly contaminated discharge to the Alamosa drainage during the 1994 spring season.

In general, each of the remedies discussed in the FFSs are anticipated to have a gradual impact upon water quality and cannot be guaranteed to dramatically improve conditions over a short time frame. Also, because of on-going water treatment, implementation of the remedies is expected to allow EPA to discontinue water treatment while maintaining compliance with current water quality standards.

Comment 10:
This section [1.4.4.2 of the CWPFFS] does not provide an adequate description of the groundwater flow conditions at the Site. A discussion of the prevailing groundwater flow systems should be provided, including the groundwater flow direction, permeabilities, and storage coefficients. Also, there is no discussion provided on the regional and local hydrogeologic boundary conditions at the Site. It is unclear where the recharge and discharge (seep) areas occur, and the hydrogeologic effect of the underground workings and their significance as a hydrogeologic boundary conditions are unknown. The text does not discuss how plugging of the Reynolds Adit will effect the groundwater table conditions at the Site. If these conditions are unknown, at least a qualitative description is necessary.

The FFS does not include a description of the promised state-of-the-art groundwater flow model that was supposedly developed to make these necessary evaluations. The model, as well as information on model assumptions, model hydrogeologic boundary conditions, should be included in an adequate FFS. The results of such modeling evaluations may significantly alter the conclusions of the FFS with regard to replugging the Chandler Adit. Such simulation would have provided insight into the water table levels which could affect conclusions regarding the effectiveness of the selected alternative.

In addition, EPA does not provide in the FFS a description of the proposed monitoring to determine the effectiveness of the plugging in the short- and long-term. Evaluating the effectiveness of the Reynolds Adit Plug will require monitoring of: (1) fluctuations in the water table; (2) existing seeps; (3) changes in flow quantity; and (4) changes in water quality through these seeps. Also, monitoring the development of additional seeps is critical. Information regarding what EPA is currently considering as baseline for monitoring and what methods will be used to evaluate the effectiveness of plugging is necessary to determine the impact of plugging these two adits, particularly with regard to final site remediation. Further, information on the monitoring efforts currently being performed by EPA to monitor the potential development of additional seeps as a result of the Reynolds Adit plug, and the results of such monitoring, are critical to evaluate the effectiveness of the remedy.

Response:
EPA agrees that inclusion of the ground water model in an FS is essential to evaluating the effectiveness of a selected alternative for the South Mountain ground water regime. EPA also agrees that the results of monitoring for the various considerations outlined by the commenter are essential in assessing the impact of the Adit system plugging, particularly with regard to final Site remediation. However, the plugging of the Reynolds and Chandler Adits and their impact on the ground water are not the focus of any of the four FFSs provided for public review and inclusion of the suggested information in these FFSs is therefore inappropriate. Nonetheless, the modeling and monitoring efforts are actively being pursued and EPA anticipates that this information will be incorporated into future RI/FS documents to support a separate Reynolds Adit/South Mountain ground water ROD. These documents will be provided for public review and comment prior to remedy selection.

3.0 REFERENCES

ALL REFERENCE MATERIAL AVAILABLE IN THE EPA ADMINISTRATIVE RECORD

Table 1 Copper Content - Site Contaminated Water, 1993-1994 Record

1993/1994 ENVIRONMENTAL ANALYSIS SUMMITVILLE SUPERFUND SITE
COPPER (LBS)

SAMPLE LOCATION	1993 MAY	JUN	JULY	AUG	SEPT	OCT	NOV	DEC	1994 JAN	FEB	MAR	APR	MAY	JUN	JULY TO JUNE COPPER LOAD (LBS)	PERCENT OF CURRENT LOADING	PERCENT OF POTENTIAL LOADING
FRENCH DRAIN SUMP																	
STREAM A VALLEY CENTER DRAIN	553	1,121	831	522	1,688	563	414	417	463	409	361	354	508	2,150	8,679		
FDS-1 DIKE 1 SEEP	1,126	1,418	282	181	196	120	147	122	104	63	50	37	532	1,601	3,434		
FDS-2 LPD-1 & ROAD SEEPS	12	364		18	35	36	22	16					54	302	483		
FDS-3 LPD-4 & 5 COMBINED	827	314	51	34	46	37	28	28	23	17	18	139	258	79	757		
FRENCH DRAIN SUMP TOTAL FLOW	3,191	3,940	1,923	1,513	899	629	481	482	438	374	391	492	2,238	2,410	12,269		2.72%
HEAP LEACH PAD																	
STREAM B CWP OVERFLOW (550-DO)	8,346	4,037	791	333	349	146	76	25	4				1,191	1,464	4,378		0.97%
CROPSY WATER (TREATMENT PLANT)											2,843	1,840	7,411	6,833	18,927		4.20%
HLP LEACHATE (INFLUENT TO CDP)	39,364	37,966	33,162	24,688	22,708	21,802	19,035	16,082	13,673	9,334	9,047	7,835	6,103	9,019	192,488		42.75%
UNDERGROUND WORKINGS																	
STREAM C REYNOLDS ADIT (AD-0)	53,242	110,739	34.432	20,212	19,272	12,352	6,963	5,319	2,663	142	112	86		1,126	102,679	12.76%	22.80%
PITS (REYNOLDS ADIT TREATMENT)	12,770	15,551	19,760	18,472	19,272	12,352	6,963	5,319	2,602	94	140	154	0	0	85,178		
CHANDLER PORTAL													11,754	83,788	95,542	69.63%	21.22%
CROPSY CREEK																	
LPD-2 (EAST OF F, D. SUMP)	281	198	31	59	34	28	7	0					194	268	621		
STREAM H CROPSY CREEK	3,624	850	127	111	67	52	26	21	21	15	25	159	542	571	1,737	1.27%	0.39%
POND 4																	
STREAM F POND 4 DISCHARGE	0	761	406	728	323	78	6						1,002	1,965	4,508	3.29%	1.00%
IOWA ADIT													37	223	N/M		
OTHER CONTRIBUTORS TO WIGHTMAN FORK																	
STREAM D CLEVELAND CLIFFS	4,436	3,904	1,287	1,788	1,525	873	609	644					458	5,110	12,924	8.96%	2.73%

STREAM E NORTH DUMP DRAINAGE	3,389	3,455	866	97	31	4							1,513	1,810	4,321	3.15%	0.96%
STREAM G CLAY ORE STOCKPILE (SEEP L)	2,305	1,028											876	237	1,113	0.81%	0.25%
TREATMENT DISCHARGE TO WIGHTMAN FORK	23	45	31	22	28	32	21	13	11	0	0	0	6	24	189	0.14%	0.04%
MONTHLY TOTAL OF CURRENT CONTRIBUTIONS	54,249	105,231	17,399	4,486	1,974	1,039	662	679	33	63	-3	92	16,161	94,630	137,204	100.00%	
MONTHLY TOTAL OF ALL POTENTIAL CONTRIBUTORS	117,897	166,680	72,994	49,470	45,173	35,935	27,196	22,574	16,798	9,865	12,417	10,412	33,088	114,332	450,256		100%
WF-5.5 WIGHTMAN FORK	47,436	71,161	20,548	6,424	3,682	938	789	676	479	374	399	909	20,424	87,450	143,092		

Table 2 Cyanide Content - Site Contaminated Water, 1993-1994 Record

1993/1994 ENVIRONMENTAL ANALYSIS SUMMITVILLE SUPERFUND SITE
CYANIDE

SAMPLE LOCATION	1993 MAY	JUN	JULY	AUG	SEPT	OCT	NOV	DEC	1994 JAN	FEB	MAR	APR	MAY	JUN	JULY TO JUNE COPPER LOAD (LBS)	PERCENT OF CURRENT LOADING	PERCENT OF POTENTIAL LOADING
FRENCH DRAIN SUMP																	
STREAM A VALLEY CENTER DRAIN	450	542	955	453	245	392	584	699	645	522	420	509	591	399	6,415		
FDS-1 DIKE 1 SEEP	49	38	16	7	7	7	14	6	3	2	1	0	5	14	81		
FDS-2 LPD-1 & ROAD SEEPS	8	112		20	8	28	12	17					5	12	102		
FDS-3 LPD-4 & 5 COMBINED	0	0	0	2	0	0	0	0	0	0	0	0	0	0	2		
FRENCH DRAIN SUMP (EFFLUENT)	1,245	1,216	1,027	1,198	636	476	495	514	495	429	464	530	599	488	7,348		4.42%
HEAP LEACH PAD																	
STREAM B CWP OVERFLOW (550-DO)	0	0	0	0	0	0	0	0	0				0	0	0		
CROPSY WATER (TREATMENT PLANT)											0	0	0	0	0		
HLP LEACHATE (INFLUENT TO CDP)	34,185	29,091	25,567	17,914	16,592	16,761	15,779	14,655	13,382	8,812	8,637	7,264	5,229	8,125	158,717		95.54%
UNDERGROUND WORKINGS																	
STREAM C REYNOLDS ADIT (AD-0)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00%	0.00%
PITS (REYNOLDS ADIT TREATMENT)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00%	
CHANDLER PORTAL													0	0	0	0.00%	0.00%
CROPSY CREEK																	
LPD-2 (EAST OF F, D. SUMP)	0	0	0	0	0	0	0	0						0	0		
STREAM H CROPSY CREEK	17	104	1	17	3	0	15	0	0	1	0	1	9	7	54	6.86%	0.03%
POND 4																	
STREAM F POND 4 DISCHARGE	0	0	0	0	0	8	0						0	0	8	1.02%	0.00%
IOWA ADIT														0	N/M		
OTHER CONTRIBUTORS TO WIGHTMAN FORK																	
STREAM D CLEVELAND CLIFFS	1	0	0	0	0	0	0	0					0	0	0	0.00%	0.00%

STREAM E NORTH DUMP DRAINAGE	0	0	0	0	0	0								0	0	0.00%	0.00%
STREAM G CLAY ORE STOCKPILE (SEEP L)	0	0											0	0	0	0.03%	0.00%
TREATMENT DISCHARGE TO WIGHTMAN FORK	153	164	200	74	83	99	54	43	16	0	0	0	35	117	722	92.09%	0.43%
MONTHLY TOTAL OF CURRENT CONTRIBUTIONS	180	268	201	91	86	107	70	43	16	1	1	1	45	124	784	100.00%	
MONTHLY TOTAL OF ALL POTENTIAL CONTRIBUTORS	35,457	30.411	26,595	19,129	17,230	17,245	16,289	15,169	13,878	9,241	9,101	7,794	5,838	8,618	166,127		100%
WF-5.5 WIGHTMAN FORK	1,518	1,328	228	405	187	32	154	155	95	0	0	22	280	2,998	4,536		

Table 3a Site Surface Water and Treatment Plant Flow Rates, 1993-1994 Record

1993/1994 ENVIRONMENTAL ANALYSIS SUMMITVILLE SUPERFUND SITE
FLOW RATE (GPM)

	1993								1994							
SAMPLE LOCATION	MAY	JUN	JULY	AUG	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	HIGH FLOW (GPM) (7/93 TO 6/94)	LOW FLOW (GPM) (7/93 TO 8/94)
FRENCH DRAIN SUMP																
STREAM A VALLEY CENTER DRAIN	58	57	72	59	62	71	70	74	73	70	70	78	132	119	132	59
FDS-1 DIKE 1 SEEP	40	29	8	5	5	3	4	3	1	1	1	1	14	38	38	1
FDS-2 LPD-1 & ROAD SEEPS	1	19		3	3	3	3	2					4	20	20	2
FDS-3 LPD-4 & 5 COMBINED	25	25	14	12	12	13	11	10	7	6	5	5	10	13	14	5
FRENCH DRAIN SUMP EFFLUENT	151	190	124	103	95	70	70	70	70	70	70	87	185	161	185	70
HEAP LEACH PAD																
STREAM B CWP OVERFLOW (550-DO)	364	191	47	18	15	8	4	2	0				28	44	47	0
CROPSY WATER (TREATMENT PLANT)											108	74	176	162	176	74
HLP LEACHATE (INFLUENT TO CDP)	594	723	677	566	647	774	674	639	650	621	648	661	534	750	774	534
UNDERGROUND WORKINGS																
STREAM C REYNOLDS ADIT (AD-0)	486	763	398	272	229	180	119	97	46	9	7	6		58	398	6
PITS (REYNOLDS ADIT TREATMENT)	74	113	192	218	237	180	119	97	69	67	72	86	0	0	237	0
CHANDLER PORTAL													369	571	571	369
CROPSY CREEK																
LPD-2 (EAST OF F, D. SUMP)	26	28	2	5	2	2							13	29	29	2
STREAM H CROPSY CREEK	2,805	2,508	643	327	239	104	69	62	52	36	41	89	1,346	2,450	2,450	36
POND 4																
STREAM F POND 4 DISCHARGE		766	115	318	138	33	4						948	766	948	4
IOWA ADIT													20	134	N/M	N/M
OTHER CONTRIBUTORS TO WIGHTMAN FORK																
STREAM D CLEVELAND CLIFFS	202	168	52	83	59	43	33	37					109	168	168	33

STREAM E NORTH DUMP DRAINAGE	284	282	67	13	4	2							254	314	314	2
STREAM G CLAY ORE STOCKPILE (SEEP L)	49	66											37	41	41	27
MONTHLY TOTAL OF CURRENT CONTRIBUTIONS	3,752	4,440	1,083	795	440	182	106	99	52	36	41	89	3,063	4,366	4,366	36
MONTHLY TOTAL OF ALL POTENTIAL CONTRIBUTORS	4,935	5,657	2,123	1,700	1,426	1,214	973	907	818	736	874	917	3,986	5,484	5,484	736
WF-5.5 WIGHTMAN FORK	15,658	13,623	3,353	2,328	1,131	695	708	493	344	233	295	1,279	10,483	12,526	12,526	233

Table 3b Site Surface Water and Treatment Plant Water Volume

1993/1994 ENVIRONMENTAL ANALYSIS SUMMITVILLE SUPERFUND SITE FLOW (GALLONS)

HIGH FLOW LOW FLOW
SAMPLE MAY '93
JUN '93 JULY '93 AUG '93 SEPT '93
OCT '93 NOV '93 DEC '93 JAN '94
FEB '94 MAR '94 APR '94 MAY '94
JUN '94 (GALLONS) (GALLONS)
LOCATION

(7/93 TO 6/94) (7/93 TO 8/94)

FRENCH DRAIN SUMP

STREAM A 2,589,120
2,482,400 3,214,080 2,633,780
2,678,400 3,169,440 3,024,000
3,303,360 3,258,720 2,822,400
3,124,800 3,369,600 5,892,480
5,149,440 5,892,480 2,633,760
VALLEY CENTER DRAIN

FDS-1 1,785,600
1,262,800 357,120 223,200
216,000 133,920 172,800 133,920
44,640 40,320 44,640 43,200
624,960 1,637,280 1,637,280
40,320
DIKE 1 SEEP

FDS-2 44,640
820,800 133,920 129,600
133,920 129,600 89,280
178,560 846,720 846,720
89,280
LPD-1 & ROAD SEEPS

FDS-3 1,116,000
1,080,000 624,960 513,350
518,400 580,320 475,200 446,400
312,480 241,920 223,200 216,000
448,400 540,000 624,960
218,000
LPD-4 & 5 COMBINED

FRENCH DRAIN SUMP 8,740,640
8,208,000 5,535,360 4,597,920
4,104,000 3,124,800 3,024,000
3,124,800 3,124,800 2,822,400
3,124,800 3,758,400 8,258,400
6,955,200 8,258,400 2,822,400
EFFLUENT

HEAP LEACH PAD

STREAM B 16,248,960
8,251,200 2,098,080 803,520
648,000 357,120 172,800 89,280
0
1,249,920 1,918,080 2,098,080
0
CWP OVERFLOW (550-DO)

CROPSY WATER
4,821,120 3,195,800
7,856,640 6,998,400 7,856,640
3,195,800
(TREATMENT PLANT)

HLP LEACHATE 26,516,160
31,233,600 30,221,280 25,268,240
27,950,400 34,551,360 29,118,800
28,524,960 29,016,000 25,038,720
28,926,720 28,555,200 23,837,760
32,400,000 34,551,350 23,837,760
(INFLUENT TO CDP)

UNDERGROUND WORKINGS

STREAM C 21,695,040
32,961,600 17,766,720 12,142,080
9,692,800 8,035,200 5,140,800
4,330,080 2,036,584 351,850
305,021 244,080 2,496,960
17,768,720 244,080
REYNOLDS ADIT (AD-0)

PITS 3,303,360
4,881,600 8,570,880 9,731,520
10,238,400 8,036,200 5,140,800
4,330,080 3,080,160 2,701,440
3,214,080 3,715,200 0
0 10,238,400 0
(REYNOLDS ADIT TREATMENT)

CHANDLER PORTAL

16,472,160   24,654,240   24,654,240
16,472,160

CROPSY CREEK

LPD-2   1,160,640
1,209,600   89,280   223,200
86,400   89,280
580,320   1,252,800   1,252,800
86,400
(EAST OF F, D. SUMP)

STREAM H   125,215,200
108,345,600   28,703,620   14,597,280
10,324,800   4,642,560   2,980,800
2,767,680   2,321,280   1,451,520
1,830,240   3,844,800   60,055,440
105,831,360   105,831,360   1,451,520
CROPSY CREEK

POND 4

STREAM F   0
33,091,200   5,133,600   14,195,520
5,981,600   1,473,120   172,800
42,318,720   33,069,600   42,318,720
172,800
POND 4 DISCHARGE

IOWA ADIT

892,800   5,771,520   N/A
N/A

OTHER CONTRIBUTORS TO WIGHTMAN FORK

STREAM D   9,017,280
7,257,600   2,321,280   3,705,120
2,548,800   1,919,520   1,425,600
1,651,680
4,865,760   7,245,504   7,245,504
1,425,600
CLEVELAND CLIFFS

STREAM E   12,677,760
12,182,400   2,990,880   580,320
172,800   86,960
11,338,560   13,564,800   13,564,800
66,960

NORTH DUMP DRAINAGE

STREAM G 2,187,360
2,851,200
1,651,680 1,753,920 1,753,920
1,651,680
CLAY ORE STOCKPILE (SEEP L)

MONTHLY TOTAL OF 187,489,280
191,808,000 48,345,120 35,488,800
19,008,000 8,102,160 4,579,200
4,419,360 2,321,280 1,451,520
1,830,240 3,844,800 136,732,320
188,616,384 188,616,384 1,451,520
CURRENT CONTRIBUTIONS

MONTHLY TOTAL OF ALL 220,298,400
244,382,400 94,770,720 75,888,000
61,603,200 54,170,640 42,033,600
40,488,480 38,497,664 29,675,520
39,008,432 39,599,280 177,935,040
236,888,064 236,888,064 29,675,520
POTENTIAL CONTRIBUTORS

WF-5.5 WIGHTMAN FORK 694,509,120
588,513,600 149,677,920 103,921,920
48,859,200 31,002,480 30,585,600
22,007,520 15,356,160 9,394,560
13,168,800 55,252,800 467,961,120
541,105,920 541,105,920 9,394,560

Table 4

Contaminant Content at High and Low Flows - Identified AMD Streams

Stream:	Stream A	Stream B	Stream C	Stream D	Stream E	Stream F	Stream G
Recording Date							
High Flow	12/08/93	5/24/93	6/10/93	6/02/93	6/08/93	6/02/93	6/15/93
Low Flow	9/08/93	12/16/93	5/13/93	11/05/93	9/21/93	6/10/93	11/17/93
GPM							
High	74.4	597.5	910	348	283	105	1176
Low	62.1	1	74	19	1	24	0.5
Manganese Total Recoverable							
High	56.6	72	35.2	72	40	55.5	10
Low	28.61	63.54	15.4	66.09	16.6	54.75	65.53
Iron T.R.							
High	297.6	1240	1738	636	447.5	2157.1	109.25
Low	438.1	793	368.4	310.8	76.88	800	26.21
Total Cyanide							
High Flow	25.25	NR	NR	0.017	NR	<.01	<.01
Low Flow	10.95	NR	NR	<.01	NR	<.01	<.01

Aluminum and Zinc Content at High and Low Flows - Identified AMD Streams

Stream:	Stream A	Stream C	Stream D	Stream E	Stream F	Stream G	Stream H	FD-1
Recording Date								
High Flow		6/22/94	6/22/94		No Information Available			6/21/94
Low Flow	2/25/94	5/01/94	5/03/94					
Zinc, digested								
High		101	9.73					105
Low	15.96	64.1	4.99					
Aluminum, dig.								
High		1644	154.5					992.1
Low	43	967.3	60.78					

All concentrations - mg/l
NR - Not Recorded

<IMG SRC 0895096B>
<IMG SRC 0895096C>

Table 7
Potential Chemical Specific ARARs

Standards, Requirements, Criteria, Limitations	Citation	Description	Potentially Applicable or Relevant and Appropriate	Comment
GROUNDWATER;				
National Primary Drinking Water Standards	40 C.F.R. Part 141, Subpart B pursuant to 42 U.S.C. §§ 300g-1 and 300j-9. State: 5 CCR 1003-1 pursuant to C.R.S. § 25-1-107(1)(k)	Establishes numeric standards for public water systems. Maximum contaminant levels (MCLs) are established to protect human life-time drinking water exposure.	No	No public water supplies are present, the State of Colorado has comprehensive ground-water classification system, including numeric standards equivalent to (MCLs). See section 3.2.1.
National Secondary Drinking Water Standards	40 C.F.R. Part 143, pursuant to 42 U.S.C. §§ 300g-1(c) and 300j-9	Establishes aesthetics-related standards for public water systems (secondary maximum contaminant level).	No	Protects aesthetic character, not relevant to protection of human health or environment.
Maximum Contaminant Level Goals	40 C.F.R. Part 141, Subpart F, pursuant to 42 U.S.C. § 300g-1	Establishes drinking water quality goals set at levels of no known or anticipated adverse health effects, with an adequate margin of safety.	No	No non-zero MCLGs set at levels less than MCLs were identified for contaminants of concern.
Colorado Ground Water Standards	State: 5 CCR 1002-8 §§ 3.11.0 - 3.11.8	Establishes a scheme for identifying groundwater specified areas, for classification of Colorado ground water and provides numeric standards. Also, establishes an interim narrative standard for all unclassified ground water, supplementing statewide standards.	Applicable	See section 3.2.1.
Wild and Scenic Rivers Act	16 U.S.C. §§ 1271-1287 40 C.F.R. § 6.302(e) 36 C.F.R. Part 297	Establishes requirements applicable to water resource development projects affecting wild, scenic, or recreational rivers within or studied for inclusion in the National Wild and Scenic Rivers System.	Applicable	The site is not a wild, scenic, or recreational river in the National Wild and Scenic River Systems. It will be determined if any part of the site is included in the inventory of rivers under consideration.

Table 7 (continued)
Potential Action Specific ARARs

Potentially Applicable or Relevant and Appropriate	Citation	Description	Potentially Applicable or Relevant and Appropriate	Comment
Executive Order on Protection of Wetlands	Exec. Order No. 11,990 40 C.F.R. § 6.302(b) and Appendix A	Requires federal agencies to evaluate the potential effects of actions they may take in wetlands to minimize adverse impacts to the wetlands.	Applicable	Wetlands will be inventoried and considered.
Executive Order on Floodplain Management	Exec. Order No. 11,988 40 C.F.R. § 6.302(b) and Appendix A	Requires federal agencies to evaluate the potential effects of actions they may take in a floodplain to avoid, to the maximum extent possible, the adverse impacts associated with direct and indirect development of a floodplain.	Applicable	Floodplains potentially impacted will be inventoried and considered
Rivers and Harbors Act of 1899, Section 10 Permit	33 U.S.C. § 403 33 C.F.R. Parts 320-330	Requires permit for structures or work in or affecting navigable waters.	No	Surface water of the Summitville Mine Site are not navigable within the meaning of Section 10 of the Rivers and Harbors Act of 1899.
Wildlife Commission Regulations	State: 2 CCR 405-0	Establishes specific requirements for protection of wildlife.	Applicable	During the design phase of the remedy, requirements for the protection of wildlife will be met in the Summitville Mine area.
Fish and Wildlife Coordination Act	16 U.S.C. §§ 661-666 40 C.F.R. § 6.302(g)	Requires consultation when federal department or agency proposes or authorizes any modification of any stream or other water body to provide for adequate provision for protection of fish and wildlife resources.	Applicable	Prior to modification of water bodies appropriate agencies will be consulted. See section 5.1.

Table 7 (continued)
Potential Action Specific ARARs

Potentially Applicable or Relevant and Appropriate	Citation	Description	Potentially Applicable or Relevant and Appropriate	Comment
Endangered Species Act	16 U.S.C. §§ 1531-1543 50 C.F.R. Parts 17, 402 40 C.F.R. § 6.302(h) State: C.R.S. §§ 33-2-101, et seq.	Requires that federal agencies insure that any action authorized, funded, or carried out by the agency is not likely to jeopardize the continued existence of any threatened or endangered species or destroy or adversely modify critical habitat.	Applicable	A survey of threatened and endangered species is underway. Prior to any action that would jeopardize the continued existence of any threatened or endangered species or destroy or adversely modify critical habitat, appropriate State and Federal agencies will be consulted. See section 5.3.
Coastal Zone Management Act	16 U.S.C. §§ 1451-1464	Prohibits federal agencies from undertaking any activity that is not consistent with a state's approved coastal zone management program.	No	The site is not in the vicinity of a coastal zone.
National Historic Preservation Act	16 U.S.C. § 470 40 C.F.R. § 6.301(b) 36 C.F.R. Part 800 State: C.R.S. §§ 24-80-101-108	EPA must account for the affects of any action on any property with historic, architectural, archeological or cultural value that is listed or eligible for listing on the National Register of Historic Places, or the Colorado Register of Historic Places.	Applicable	A survey will be performed so that the Colorado State Historic Preservation Officer may determine if parts of the site are eligible for inclusion on the State or National registers. (See section 5.2).
Archeological and Historic Preservation Act of 1974	16 U.S.C. § 469 40 C.F.R. § 6.301(c)	Establishes procedures to preserve historical and archeological data which might be destroyed through alteration of terrain as a result of a federal construction project or a federally licensed activity or program.	Applicable	A survey will be performed to identify data that requires protection during remedial activities.
Historic Sites Act of 1935, Executive Order 11593	16 U.S.C. §§ 461 et seq. 40 C.F.R. § 6.301(a)	Requires federal agencies to consider the existence and location of landmarks on the National Registry of Natural Landmarks to avoid undesirable impacts on such landmarks.	Applicable	A survey will be performed to identify potential natural landmarks.

Table 7 (continued)
Potential Action Specific ARARs

Potentially Applicable or Relevant and Appropriate	Citation	Description	Potentially Applicable or Relevant and Appropriate	Comment
Colorado Wildlife Enforcement and Penalties	State: C.R.S. §§ 33-1-101, et seq.	Prohibits actions detrimental to wildlife.	Applicable	During the design phase of the remedy, consideration will be given to the protection of wildlife.
Occupational Safety and Health Act	29 U.S.C. §§ 651-678	Regulates worker health and safety.	No	While not an ARAR, these requirements will apply during implementation of remedies at the site.
Federal Mine Safety and Health Act	30 U.S.C. §§ 801-962	Regulates working conditions in underground mines to assure safety and health of workers.	No	While not an ARAR, the requirements will be met if it becomes necessary to access underground mine workings.
Hazardous Materials Transportation Act, D.O.T. Hazardous Materials Transportation Regulations	49 U.S.C. §§ 1801-1813, 49 C.F.R. Parts 107, 171-177	Regulates transportation of hazardous materials	Applicable	If hazardous materials are transported offsite these regulations will be attained. Will apply to sludges or spent or process chemicals if determined hazardous.
Colorado Noise Abatement Statute	State: C.R.S. §§ 25-12-101, et seq.	Establishes standards for controlling noise.	No	While not an ARAR, applicable standards will be met during construction activities at the Summitville site.
Colorado Mined Land Reclamation Act	State: C.R.S. § 34-32-101 et seq. and regulations, 2 CCR 407-1	Regulates all aspects mining, including location of operations, reclamation, and other environmental and socioeconomic impacts.	Yes	See section 4.6.
National Pretreatment Standards	40 C.F.R. Part 403, pursuant to 33 U.S.C. § 1317	Sets standards to control pollutants which pass through or interfere with treatment processes in publicly owned treatment works or which may contaminate sewage sludge.	No	No discharge to a publicly owned treatment works is anticipated.

Table 7 (continued)
Potential Action Specific ARARs

Potentially Applicable or Relevant and Appropriate	Citation	Description	Potentially Applicable or Relevant and Appropriate	Comment
Toxic Pollutant Effluent Standards	40 C.F.R. Part 129, pursuant to 33 U.S.C. § 1317	Establishes effluent standards or prohibitions for certain toxic pollutants: aldrin/dieldrin, DDT, endrin, toxaphene, benzidine, PCBs.	No	The discharge of specified pollutants is not anticipated.
Dredge or Fill Requirements (Section 404)	40 C.F.R. Paris 230, 231 33 C.F.R. Part 323, pursuant to 33 U.S.C. § 1344	Requires permits for discharge of dredged or fill material into navigable waters.	No	No construction activities are applicable involving dredging in water treatment.
Marine Protection, Research & Sanctuary Act	13 U.S.C. §§ 1401-1445	Regulates ocean dumping.	No	Ocean dumping will not occur.
Toxic Substances Control Act PCB Requirements	15 U.S.C. § 2605(0) 40 C.F.R. Part 761	Establishes disposal requirements for PCBs	No	At this time it is not anticipated that remedial activities will involve the disposal of PCBs.
Uranium Mill Tailings Radiation Control Act	42 U.S.C. §§ 7901-7942 42 U.S.C. § 2022	Establishes requirements related to uranium mill tailings.	No	Uranium mill tailings are not present at the site.
Surface Mining Control and Reclamation Act	30 U.S.C. §§ 1201-1328	Establishes provisions designed to protect the environment from the effects of surface coal mining operations.	No	Not relevant. Creates no substantive cleanup requirements.
SAFE DRINKING WATER ACT				
Underground Injection Control Regulations	40 C.F.R. §§ 144.12, 144.24, and 144.25, pursuant to 42 U.S.C. § 121 (e)(1)	Establishes requirements for injection of waste water into wells and aquifers.	No	Underground injection is not anticipated.
CLEAN WATER ACT				
National Pollutant Discharge Elimination System	40 C.F.R. Parts 122, 125 pursuant to 33 U.S.C. § 1342 5 CCR 1002-2, §§ 6.1.0 to 6.18.0, pursuant to C.R.S. § 25-8-501	Requires permits for the discharge of pollutants from any point source into waters of the United States including stormwater.	Applicable	See sections 4.3 and 4.4.

Table 7 (continued)
Potential Action Specific ARARs

Potentially Applicable or Relevant and Appropriate	Citation	Description	Potentially Applicable or Relevant and Appropriate	Comment
Amendment to the Settlement of July 1, 1991	July 21, 1992 agreement between Co. Mined Reclamation Board, Co. Mined Reclamation Division, CO. Water Quality Control Division, the Executive Director of the CDPHE and the SCMCI	Establishes Numerical Criteria Limits for water quality for outfall 004 (WF5.5) and a compliance plan	Considered	
Effluent Limitations	40 C.F.R. Part 440, pursuant to 33 U.S.C. § 1311 5 CCR 1002-3, §§ 10.1 to 10.1.7, pursuant to C.R.S. § 25-8-503	Sets technology-based effluent limitations for point source discharges in the Ore Mining and Dressing Point Source category. Also provides exemption for release of storm water where defined BMP criteria are implemented.	Relevant and Appropriate	See section 4.3.
Guidelines for Development and Implementation of State Solid Waste Management Plans	40 C.F.R. Part 256, pursuant to 42 U.S.C. § 6901, et seq.	Establishes requirements for federal approval of state programs to regulate open dumps.	No	Creates no substantive cleanup requirements.
Criteria for Classification of Solid Waste Disposal Facilities and Practices	40 C.F.R. Part 257, pursuant to 42 U.S.C. § 6901, et seq.	Establishes criteria for solid waste disposal facilities and practices.	No	Disposal of mine wastes and closure of mines are specifically addressed by the Colorado Mined Land Regulations. See section 4.2.
Hazardous Waste Management System: General	40 C.F.R. Part 260 State: 6 CCR 1007-3 Part 260	Establishes procedures and criteria for modification or revocation of any provision in parts 260-265.	No	Creates no substantive cleanup requirements.
Identification and Listing of Hazardous Waste	40 CER. Part 261, pursuant to 42 U.S.C. § 6921 State: 6 CCR 1007-3 Part 261, pursuant to C.R.S. § 25-15-302	Defines those solid wastes which are subject to regulation as hazardous wastes under 40 C.F.R. Parts 262-265 and Parts 124, 270, 271.	Applicable	Provides for the identification of hazardous wastes; used to determine disposal criteria for sludges & spent process chemicals generated from water treatment.

Table 7 (continued)
Potential Action Specific ARARs

Potentially Applicable or Relevant and Appropriate	Citation	Description	Potentially Applicable or Relevant and Appropriate	Comment
Standards Applicable to Generators of Hazardous Waste	40 C.F.R. Part 262, pursuant to 42 U.S.C. § 6922 State: 6 CCR 1007-3 Part 262, pursuant to C.R.S. § 25-15-302	Establishes standards for generators of hazardous waste.	Applicable	If hazardous waste are generated onsite and managed offsite the requirements are applicable. Used to handle process chemicals and sludge management for water treatment.
SOLID WASTE DISPOSAL ACT ("SWDA")				
Guidelines for the Thermal Processing of Solid Wastes	40 C.F.R. Part 240, pursuant to 42 U.S.G. § 6901, et seq.	Prescribes guidelines for thermal processing of municipal solid wastes.	No	Thermal processing will not occur.
Guidelines for the Land Disposal of Solid Wastes	40 C.R.S. Part 241, pursuant to 42 U.S.C. § 6901, et seq.	Establishes requirements and procedures for land disposal of solid wastes.	No	Disposal of mine wastes and closure of mines are specifically addressed by the Colorado Mined Land Regulations. See section 4.2.
Colorado Regulations Pertaining to Solid Waste Disposal Sites and Facilities	State: 6 CCR 1007-2, pursuant to C.R.S. § 30-20-101 and C.R.S. §30-20-102, et seq.	Establishes requirements and procedures for land disposal of solid wastes and the siting of disposal facilities.	No	Disposal of mine wastes and closure of mines are specifically addressed by the Colorado Mined Land Regulations. See section 4.2
Guidelines for the Storage and Collection of Residential, Commercial, and Institutional Solid Waste	40 C.F.R. Part 243, pursuant to 42 U.S.C. § 6901, et seq.	Establishes guidelines for collection of residential, commercial, and institutional solid wastes.	No	Not relevant.
Source Separation for Materials Recovery Guidelines	40 C.F.R. Part 246, pursuant to 42 U.S.C. § 6901, et seq.	Establishes requirements and recommended procedures for source separation by federal agencies of residential, commercial, and institutional solid wastes.	No	Not relevant. Creates no substantive cleanup requirements.

Table 7 (continued)
Chemical Specific Criteria To-Be-Considered (TBC)

Standards, Requirements Criteria, Limitations	Citation	Description	Potentially Applicable or Relevant and Appropriate	Comment
RCRA Groundwater Protection Standard (RCRA GPs)	40 CFR §§ 264.92-264.101 State: 6 CCR 1007-3	Establishes standards for ground water quality related to RCRA hazardous waste facilities.	No	The State of Colorado has comprehensive ground-water classification system, including numeric standards equivalent to MCLs and RCRA GPS.
SURFACE WATER:				
Colorado Water Quality Standards	State: 5 CCR 1002-8, §§ 3.1.0-3.1.17	Establishes standards and classifications for Colorado surface waters.	Applicable	See section 3.1.1.
Federal Water Quality Criteria	40 C.F.R. Part 131 Quality Criteria for Water, 1986, pursuant to 33 U.S.C. § 1314	Sets criteria for surface water quality based on toxicity to aquatic organisms and human health.	Relevant and Appropriate	See section 3.1.2.
AIR:				
National Primary and Secondary Ambient Air Quality Standards	40 C.F.R. Part 50, pursuant to 42 U.S.C. § 7409. State: C.R.S. § 25-7-108, 5 CCR 1001-14.	Establishes standards for ambient air quality to protect public health and welfare (including standards for particulate matter and lead).	Applicable	See section 3.4.
National Emission Standards for Hazardous Air Pollutants	40 C.F.R. Part 61, Subparts N, O, P pursuant to 42 U.S.C. § 7412. State: C.R.S. § 25-7-108, 5 CCR 1001-10	Sets emission standards for designated hazardous pollutants.	No	Air emissions are not anticipated after construction activities are complete. See section 3.4.
SOILS:				
Toxic Substances Control Act, PCB Spill Cleanup Policy	52 FR 10688 April 2, 1987	Establishes guidance cleanup levels for PCB contaminant soils.	Not considered	There is no evidence that PCB spills have occurred.
Interim Guidance on Establishing Soil Lead Cleanup Levels at Superfund Sites	EPA Directive #9355.4-02, September 1989.	Established guidance cleanup levels for lead contaminated soils.	Considered	See section 3.3.

Table 7 (continued)
Potential Action Specific ARARs

Potentially Applicable or Relevant and Appropriate	Citation	Description	Potentially Applicable or Relevant and Appropriate	Comment
Standards Applicable to Transporters of Hazardous Waste	40 C.F.R. Part 263, pursuant to 42 U.S.C. § 6923 State: 6 CCR 1007-3 Part 263, pursuant to C.R.S. § 25-15-302, 4 CCR 723-18	Establishes standards which apply to persons transporting hazardous waste within the U.S. if the transportation requires a manifest under 40 C.F.R. Part 262.	Applicable	If hazardous wastes are transported offsite the requirements are applicable.
Standards for Owners and Operators of hazardous Waste Treatment, Storage, and disposal Facilities	40 C.F.R. Part 264,pursuant to 42 U.S.C. § 6924, 6925 State: 6 CCR 1007-3 Part 264, subparts B, C, D, E, F, G, K, L, and N, pursuant to C.R.S, § 25-15-302	Establishes standards which define the acceptable management of hazardous waste for owners and operators of facilities which treat, store, or dispose of hazardous waste.	Yes	See section 4.1.
Interim Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities	40 C.F.R. Part 265 State: 6 CCR 1007-3, Part 265	Establishes standards for management of hazardous waste during interim status.	Relevant and Appropriate	Establishes no substantive standards applicable or relevant and appropriate to the HLP.
Standards for the management of Specific hazardous Wastes and Specific Types of Hazardous Waste Management Facilities	40 C.F.R. Part 266 State: 6 CCR 1007-3, Part 267	Establishes requirements which apply to recyclable materials that are reclaimed to recover economically significant amounts of precious metals, including gold and silver.	No	Not relevant to activities at the site.
Interim Standards for Owners and Operators of New Hazardous Waste Land Disposal Facilities	40 C.F.R. Part 267 State: 6 CCR 1007-3, Part 267	Establishes minimum national standards that define acceptable management of hazardous waste for new land disposal facilities.	No	Part 267 regulations are no longer effective after February 13, 1983.
Hazardous Waste Permit Program	40 C.F.R. Part 270 State: 6 CCR 1007-3, Part 100	Establishes provisions covering basic EPA permitting requirements.	No	A permit is not required for onsite CERCLA response actions.
Underground Storage Tanks	40 C.F.R. Part 280	Establishes regulations related to underground storage tanks.	No	The use of or remediation of underground storage tanks is not anticipated.

Table 8
Numeric Surface Water Quality Goals and ARARs
Alamosa River - Monitoring Station AR-45.4

METAL	SURFACE WATER QUALITY GOALS Class 1 (TVS)
pH	6.5-9.0
Aluminum, chronic	87µg/l dissolved, May 1 through September 1 only. For balance of year Chronic = Acute TVS = 750µg/l dissolved
Arsenic, acute	50µg/l, total recoverable, 1-day
Cadmium, chronic	2.3µg/l dissolved @ 250mg/l hardness
Chrome VI, chronic	11µg/l dissolved
Copper, chronic	30µg/l dissolved, based upon 85th percentile ambient data from segment 3a
Cyanide	5µg/l, 1 day
Iron, chronic	12,000µg/l, total recoverable, based upon 85th percentile ambient data
Lead, chronic	14µg/l dissolved @ 250 mg/l hardness
Manganese, chronic	1000µg/l, dissolved
Mercury, chronic	0.01µg/l, total recoverable
Nickel, chronic	192µg/l dissolved @ 250mg/l hardness
Silver, chronic, trout	0.36µg/l dissolved @ 250mg/l hardness
Zinc, chronic	230µg/l dissolved @ 250mg/l hardness

Note: Based upon WQCD finding of 250mg/l hardness. Reservoir.

TABLE 9

HEAP LEACH PAD REMEDIAL ALTERNATIVES

Alternative	Remedial Activities
5-1 - No Action	! Monitoring
5-2 - Pump & Treat/Recontour & Cap	! Pump & Treat Leachate; Grade, Recontour, Cap & Revegetate; Seepage Collection with Standby Water Treatment Monitoring
5-3 - Injection-Extraction Wells/ Pump & Treat/Biotreatment/ Recontour & Cap/Bioreactor	! Injection-Extraction Well Solution Collection; Pump & Treat Leachate; Biotreatment; Grade, Recontour, Cap & Revegetate; Surge Pond; Bioreactor; Monitoring
5-4 - Extraction Pumps & Underdrippers/ Water Rinse/Recontour & Cap	! Water Rinse HLP; Grade, Recontour, Cap & Revegetate; Continual Standby Water Treatment; Monitoring
5-5 - Partial HLP Removal/Injection-Extraction Wells/Water Rinse/ Recontour & Cap	! Remove Top Section of HLP to Mine Pit; Injection-Extraction Well Solution Collection; Water Rinse; Grade, Recontour, Cap & Revegetate; Monitoring
5-6 - Pump & Treat/Total HLP Removal/ Ex situ Ore Treatment Disposal On-Site	! Pump & Treat Leachate; Total HLP Removal; Dispose & Soil Wash HLP Solids On-Site; Amend Footprint & Cap Areas; Monitoring

Table 10
Comparative Analysis of Alternatives

Alternative Effectiveness	Protection of Health and Environment Implementability	Long-Term Effectiveness Costs	Compliance with ARARs	Reduction in Toxicity, Mobility or Volume	Short-Term	Implementability	Costs
Alternative 5-1: None No Action	None	None	None	None	None	Easy	$261,000
Alternative 5-2: Yes Pump and Treat/ Recontour and Cap	Moderate	Moderate	Yes	Yes	Yes	Moderate	$13,772,000
Alternative 5-3: Yes Injection-Extraction Wells/Pump and Treat/Biotreatment/Recontour and Cap/Bioreactor	High	High	Yes	Yes	Yes	Moderate	$18,929,000
Alternative 5-4: Yes Extraction Pumps/Water Rinse/Recontour and Cap	Moderate	Moderate	Yes	Yes	Yes	Easy	$21,411,000
Alternative 5-5: Yes Partial HLP Removal/Injection- Extraction Wells/Water Rinse/Recontour Cap	High	High	Yes	Yes	Yes	Moderate	$22,923,000
Alternative 5-6: Yes Pump and Treat/Total HLP Removal/Ex Situ Ore Treatment/Disposal On Site	High	High	Yes	Yes	Yes	Difficult	$74,176,000

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